

Department of Forensic Sciences  
Forensic Science Laboratory Division

**Forensic Biology Unit  
Training Manual**

# **Forensic Biology Unit Training Manual**

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## 1.0 Training Goals and Objectives

### 1.1 Overview of the Training Manual

- 1.1.1 The purpose of this manual is to provide a format for training new employees in the Forensic Biology Unit (FBU) of the District of Columbia, Department of Forensic Sciences (DFS). The training outline provides guidance for training on specific topics of competence for Forensic Biology Analyst/Technician/Laboratory Support Personnel Trainees. The complete training program involves traditional instruction (e.g., modules, readings), and e-learning, as well as apprentice style training; working with qualified Forensic Biology Unit members. These qualified analysts/technicians/laboratory support personnel (qualifications determined by authorization memo) will act as designated Trainers under the direction of the FBU Manager, FBU Training Coordinator, FBU Technical Leader(s), DFS Training Manager.

### 1.2 Format of the Training Program

- 1.2.1 The FBU Training Program incorporates the Scientific Working Group on DNA Analysis Methods (SWGDAM) Training Guidelines addressing each of the following: laboratory introduction, fundamental scientific knowledge, applied scientific knowledge, sample and/or evidence control, laboratory analysis, interpretation and analysis, reports and notification, legal issues and final evaluation. The training program supplements the educational and training requirements of the FBI Quality Assurance Standards (QAS) for Forensic DNA Testing Laboratories. These requirements are designed to ensure that technical staff have the training, education and proficiency commensurate with their duties.
- 1.2.2 The FBU Training Program, in its entirety, is designed for the Forensic Biology Analyst/Technician/Laboratory Support Personnel Trainee who has little to no prior background or experience in the subject matter. The training program is divided into modules. Each module may contain required readings, e-learning component(s), practical exercises and study questions, in addition to other duties as assigned. The topics covered in the training program should impart a fundamental understanding of the work that a Forensic Biology Analyst/Technician/Laboratory Support Personnel is expected to understand and perform in the position. The FBU Training Program is intended to be used as a *guide* for training and is not a rigid, inflexible program. Many of the modules may be performed concurrently and do not have to be completed in the sequence or order in which they are presented. The modules may be modified depending on the needs of the DFS, FBU, Trainer(s), and/or facility availability. The FBU training program may consist of in-service training, training from external agencies, vendors, or a combination.

- 1.2.3 It is estimated that this training program for an analyst Trainee can be completed, in its entirety, in approximately sixteen (16) months; however, the program may take more or less time to complete depending on the progress of the Trainee and the circumstances in the FBU. The estimated timeframe for an analyst Trainee to complete the training program is also dependent upon their assigned duties. It may take more or less time to get practical exposure to some of the techniques in the outline due to the nature of the cases received by the FBU. The estimated time for a technician/laboratory support personnel Trainee to complete the training program is dependent upon their assigned duties.
- 1.2.4 Satisfactory understanding of the information learned in the modules may be demonstrated through written examinations (grade  $\geq 80\%$ ), oral presentations, practical examinations and/or exercises. The format of the training program is designed to provide:
  - 1.2.4.1 Self-paced modules to allow for schedule flexibility
  - 1.2.4.2 Increased time available for hands on apprentice style training
  - 1.2.4.3 Reduced time from training inception to casework production
  - 1.2.4.4 Consistent quality of training
  - 1.2.4.5 Documentation and tracking of training for quality purposes
- 1.2.5 It is paramount that the Forensic Biology Analyst Trainee understands that the ultimate objective of this training is:
  - 1.2.5.1 To independently and competently examine and compare evidence relating to body fluid identification and/or DNA analysis, to include, but not be limited to, body fluid identification, DNA sample collection, extraction, quantitation, amplification, detection, DNA interpretation, statistical analysis, report writing and other routine duties (e.g., reagent preparation, maintenance of equipment and quality control testing).
  - 1.2.5.2 To independently and competently render an opinion and reach conclusions relating to examinations and comparisons.
  - 1.2.5.3 Demonstrate competence in presenting information to the Customer, including testimony in court as an Expert Witness
  - 1.2.5.4 To give expert testimony in court in matters encompassed within the broad definition of body fluid identification and DNA analysis and to do this in a professional, competent, transparent, and impartial manner.
- 1.2.6 It is paramount that the Technician/Laboratory Support Personnel Trainee understands that the ultimate objective of this training is:
  - 1.2.6.1 To independently and competently perform laboratory procedures related to the processing of DNA samples, to include, but not limited to DNA sample collection, extraction, quantitation, amplification, detection, and other routine duties (e.g., reagent preparation, maintenance of equipment and quality control testing) that assist the qualified Forensic Biology Analysts, where applicable.

- 1.2.6.2 Demonstrate competence in presenting information to the Customer, including testimony in court as a fact witness (as needed in a professional, competent, transparent, and impartial manner).

### 1.3 Individual Training Plans (ITPs)

- 1.3.1 Each Trainee will have their previous training, experience, education, published articles, and other credentials reviewed by the FBU Technical Leader(s). Additional reviews may be performed by the DFS Training Manager/FBU Unit Manager or designee. Collected data and information obtained from detailed interviews of the FBU Trainee will be utilized to establish a baseline in regard to the Trainee's technical knowledge, skills and abilities. The knowledge gaps identified will become the basis for an individual training plan tailored to the Trainee's needs. This process will provide a flexible, focused, and efficient approach for training individuals new to the discipline, as well as individuals that have been involved in a training program elsewhere. Demonstrated competency levels may allow a Trainee to test out of particular modules within the training program.
- 1.3.2 In the event the Technical Leader(s) will be performing casework and/or technical review of casework, their previous training, experience, education, published articles, and other credentials will be reviewed by the FBU Manager or designee and a specialized training plan for the Technical Leader(s) will be documented in an individual training plan.
- 1.3.3. The ITP will be documented using the Individual Training Plan form (Document Control Number 12823). The ITP is approved by the FBU Technical Leader(s), the FBU Manager, and the DFS Training Manager (or designee). Once a training plan has been established for a Trainee, they will be assigned Trainer(s) for the mentorship/supervised casework portion of training. Trainer(s) will serve as the first line verification that deliverables and milestones within the training program have been met. The progress of the Trainee will be monitored through the use of module checklists, in which successful completion of a module will be indicated by the signatures of the Trainee, Trainer(s), and FBU Technical Leader(s).
- 1.3.4 External training courses may be substituted for specific module requirements with approval and documentation by the FBU Technical Leader(s) and DFS Training Manager, as applicable.

### 1.4 Contractors & Previously Experienced Analysts/Technicians/Laboratory Support Personnel

- 1.4.1 ITPs will be established and documented in accordance with section 1.3.

### 1.5 Oral Boards

- 1.5.1 Oral boards are designed to test the Trainee's knowledge on what they have learned in the training program. The purpose of oral boards is to

ensure the Trainee's competence in a particular topic and prepare them for court testimony by exposing them to presentation of technical material throughout the training process and breaking down technical processes into manageable learning modules.

#### 1.5.2 Guidelines for Oral Boards:

1.5.2.1 Trainees will be provided a topic / question to address within certain modules. The Trainee shall answer the topic/question orally to a panel, without notes. Oral boards can be formatted as a discussion or presentation. Following the oral presentation by the Trainee, the panel members will ask a series of questions related to the topic, or topics previously mastered, in the training program. Two types of responses may be expected. First, a technical response. Second, there may also be times where the Trainee will need to respond as if speaking to a jury. It will be made clear during the question which type of response is expected.

1.5.2.2 Each question posed by the panel will be documented.

1.5.2.3 The oral board panel will consist of evaluators, observers may be permitted. Three (3) evaluators are required, all evaluators being subject matter experts (i.e. FBU Manager/Technical Leader(s), Trainer, and qualified analyst/technician/laboratory support personnel). At least one evaluator must be a qualified FBU analyst/technician/laboratory support personnel. A member of the Training Unit and the Quality Unit must also be present as observers. Permitting additional "observers" is at the discretion of the FSL Director or FBU Management. Observers can review and provide feedback to the Trainee as to performance; however, they will not be a grading evaluator.

1.5.2.4 Each evaluator is required to document the assessment of the Trainee's responses using an Oral Board Scoring Sheet (Document Control Number 13203). The rubric will show what will be expected of the Trainee and used to evaluate their performance.

1.5.2.5 In order to pass the oral board, the Trainee must demonstrate sufficient knowledge of the subject, while presenting the information in an easy to understand method, and sufficiently answer technical questions posed by the panel.

#### 1.6 Thirty (30) Day Progress Reports

1.6.1 Each Trainee's progress should be reviewed and reported every thirty days by FBU management or designee. It is the responsibility of the Trainee to report their progress on a FBU 30-Day Progress Report form

(Document Control Number 7496). The report should be submitted to the FBU management, the FBU Training Coordinator, the FBU Technical Leader(s), and the DFS Training Manager or designee at the end of each month for the duration of the training. These 30-Day Progress Report forms serve as the basis for Trainees to later review their progress and will serve as a reference in months and even years following qualification.

## 1.7 Training Binder

- 1.7.1 All practical work conducted by the Trainee will be maintained in a “Training Binder”. Whether notes are maintained electronically or hard copy is up to the discretion of the Trainee. The training binder should be available for final review at the end of the training program. This binder will serve as a reference in the months and even years following qualification, and will assist in documenting the progress during training, where applicable.

## 1.8 Practical Examination(s)

- 1.8.1 N/A

## 1.9 Forensic Biology Examination Competency Test(s)

- 1.9.1 Regardless of previous experience, each Trainee will be required to pass competency test(s) for all methods/procedures for which they will be expected to perform examinations.
- 1.9.2 The competency test(s) will include practical components. Competency testing for a new analyst/technician will include a practical component, and written and/or oral components. Competency testing for a new laboratory support personnel will include practical component(s) and oral component(s). These will be provided and administered by the FBU Manager/Technical Leader(s) or designee.

## 1.10 Mock Trial

- 1.10.1 Upon completion of the FBU Training Program, the Trainee will participate in mock trials, where applicable. The Trainee will be expected to successfully complete, at minimum, one internal mock trial and one external mock trial. The external mock trial will be performed by attorneys external to the agency.
- 1.10.2 The purpose of the mock trial is to evaluate the Trainee’s ability to testify as an expert witness in judicial proceedings. The mock trials will highlight the Trainee’s oral presentation skills and their ability to relate complex scientific and technical information to lay persons. Sessions will be conducted in a simulated courtroom situation with the proceedings being formal and structured.

- 1.10.3 The mock trials may occur with a gradual succession of difficulty and may cover multiple sub-categories of the work that will be performed as a Forensic Biology Analyst/Technician. The mock trial(s) may be based on a mock case worked during the mentoring period, notes, diagram(s), and/or report(s). The Trainee will defend their work and/or conclusions reached from the review and/or work. The Trainee will be scored using the Mock Trial Scoring Sheet (Document Control Number 7495). Results of the mock trial will be provided to the Trainee. The mock trial(s) may also be recorded for future reference.

## 1.11 Completion of the Program

- 1.11.1 Successful completion of all of the requirements of the training program signifies that the Trainee is qualified to perform as a Forensic Biology Analyst/Technician/Laboratory Support Personnel at the DFS. The FBU Technical Leader(s) must concur in regard to the Trainee's state of readiness before the authorization memo is issued.

## 1.12 Authorization Memo

- 1.12.1 A Trainee will receive a dated authorization memo, issued by the FBU Technical Leader(s), prior to performing duties within the FBU, following the determination of competency. Prior to the memo being issued, the FBU Technical Leader(s) will review the training records for the Trainee. This authorization memo will clearly outline the platform, procedures and techniques the individual is competent to independently perform, whether it is casework examination, laboratory technique(s), case reviews and/or use of equipment, as applicable.
- 1.12.2 For Trainees with no previous interpretation and/or reporting experience, the authorization memo will also clearly outline the platform and procedures the individual may perform under the guidance of a mentor. The memo will specify the minimum period of time for the mentored casework, typically six months. The mentor will be a qualified analyst and will be assigned by the FBU Manager, or designee. Cases worked during the mentored casework phase will be documented using the FBU Mentored Casework Form (Document Control Number: 17146). Upon successful completion of the mentored casework phase, a new authorization memo will be issued outlining the procedures the individual is now competent to perform independently.

## 1.13 Training in New / Additional Methods and Technologies

- 1.13.1 For an analyst/technician/laboratory support personnel who has completed the laboratory training program and is undergoing training in an additional method for which they are not currently qualified or when an analyst/technician/laboratory support personnel is trained in a newly validated and implemented method, a demonstration of competency must be performed. The Supplemental Training Checklist Form (Document



Control Number: 12880) may be used to document the training, if applicable. The demonstration of competency will include a practical component.

1.13.2 For an analyst who has completed the laboratory training program and is undergoing training in the interpretation of data using an additional technology, typing test kit, platform, or interpretation software for which they are not currently qualified or when the analysts/technician/laboratory support personnel are trained in a newly validated and implemented technology, typing test kit, platform, or interpretation software, a demonstration of competency must be performed. The Supplemental Training Checklist Form (Document Control Number: 12880) may be used to document the training, if applicable. The demonstration of competency will include a practical component.

1.13.3 For personnel intimately involved in a validation, the Technical Leader(s) may allow the validation to serve as the demonstration of competency.

#### 1.14 Re-qualification for Reinterpretation of Legacy Data

1.14.1 See the FBU Quality Assurance Manual (FBQA01) regarding re-qualification for reinterpretation of legacy data.

#### 1.15 Re-Training

1.15.1 The re-training of an analyst/technician/laboratory support personnel may occur when findings from a corrective action or preventative action indicate that it is necessary. Re-training will also occur for individuals who have been on extended leave for a period that takes them out of the proficiency test cycle. Prior to starting casework again, a competency test must be successfully completed.

#### 1.16 Failure to Meet the Goals of the Training Program

1.16.1 Failing twice in any single module competency or failure to successfully reach all milestones in the estimated time (with exception for situations outside of the control of the Trainee) may constitute a reason for removal from the FBU training program.

1.16.2 Resolution of such cases will rest with a committee consisting of FBU Management, FSL Director, and DFS Training Manager or designee.

1.16.3 Remedial training may occur within the training program to address any shortcoming or exercise that has not been completed to the satisfaction of the Unit Manager/Technical Leader(s) or Trainer(s).

1.16.4 The ITP will be updated to include additional remedial training. The DFS Training Manager and/or Senior Deputy Director must be notified to assist with oversight and consistency through the Agency. New DFS employees may be subject to dismissal under the probationary appointment agreement.

## 1.17 Training Documentation

1.17.1 The following shall be maintained and serve as the technical training file:

- 1.17.1.1 Individual Training Plan
- 1.17.1.2 Written and oral tests
- 1.17.1.3 Training module checklists
- 1.17.1.4 Copies of presentations
- 1.17.1.5 Competency test(s)
- 1.17.1.6 30-Day Progress Report(s) (Document Control Number 7496)
- 1.17.1.7 Signed and dated Authorization Memo(s)

## 2.0 Roles and Responsibilities

### 2.1 FBU Trainee

- 2.1.1 Shall be responsible for maintaining and keeping an up-to-date training binder (whether hard or soft copy) which contains the records (i.e., checklists, notes, worksheets, photographs) generated during the training program.
- 2.1.2 Has the ultimate responsibility for learning the materials necessary to successfully complete a competency test. The Trainee should take an active role in obtaining the information needed (i.e., reading, observation, discussing/asking questions) to do so.
- 2.1.3 Shall provide 30-Day Progress Report (Document Control Number 7496) to the DFS Training Manager, FBU Technical Leader(s), FBU Manager and the FBU Training Coordinator on the last business day of each month.
- 2.1.4 Shall immediately notify the FBU Training Coordinator, FBU Manager, FBU Technical Leader(s), and/or DFS Training Manager of any problems or questions that arise, if their training is not progressing, if they are experiencing difficulty with the exercises, or to suggest modifications to the training program.

### 2.2 Trainer(s)

- 2.2.1 Should be competency and proficiency tested in the area of instruction (where applicable) and/or have documented actual experience working in the subject matter of instruction.
- 2.2.2 Shall be responsible for demonstrating a particular technique and observing the Trainee perform the same procedure where applicable.
- 2.2.3 Shall reinforce the information gained from reading materials through detailed discussion of the technique during the demonstration and/or

observation. This information should include both theoretical and practical aspects.

- 2.2.4 Shall be responsible for initialing and dating training module checklists.
- 2.2.5 Shall keep FBU management and DFS Training Manager (or designee) apprised of any deficiencies or issues that may arise with a Trainee. Deficiencies may include; not understanding technical information, not performing work in a timely fashion, refusing to complete assignments, or general personnel issues.
- 2.2.6 Should participate in Trainee oral boards.
- 2.2.7 May meet periodically with the DFS Training Manager and/or FBU Management to discuss the progress of the Trainee.

### **2.3 FBU Training Coordinator**

- 2.3.1 Shall monitor the Trainee's progress and ensure the Trainee is adhering to the prescribed timeline for completion of milestones.
- 2.3.2 Should keep the FBU Manager, FBU Technical Leader(s), and DFS Training Manager apprised of the progress of each Trainee.

### **2.4 FBU Technical Leader(s)**

- 2.4.1 Shall complete and approve ITPs and oversee the training plan for each Trainee. Shall monitor the Trainee's progress and ensure the Trainee is adhering to the prescribed timeline for completion of milestones.
- 2.4.2 Shall review the academic transcripts and training records for newly qualified analysts/technicians/laboratory support personnel and approve their qualifications prior to independent casework analysis and document such review.
- 2.4.3 Shall sign off on module checklists, where applicable, and may serve in the capacity as a Trainer.
- 2.4.4 Shall review each 30-Day Progress Report (Document Control Number 7496) to monitor the progress of the Trainee.
- 2.4.5 Shall review the Trainee's training binder for completeness and accuracy at the end of the training program.
- 2.4.6 Shall issue the Trainee authorization memo upon satisfactory completion of all required training.
- 2.4.7 Shall issue written pass/fail feedback to the Trainee at the end of mock trials.

- 2.4.8 Shall evaluate the need and assess the extent of retraining of analyst(s)/technician(s)/laboratory support personnel.
- 2.4.9 Shall complete and approve retraining plan(s), when necessary for each analyst/technician/laboratory support personnel.
- 2.4.10 Shall keep management apprised of ongoing progress of each Trainee.
- 2.4.11 Shall periodically review the training program for relevance and update the program accordingly with the FBU Training Coordinator and DFS Training Manager.

## **2.5 DFS Training Manager (or designee)**

- 2.5.1 Should review each 30-Day Progress Report (Document Control Number 7496) to monitor the progress of the Trainee.
- 2.5.2 Shall periodically review the training program for relevance and update the program accordingly with the FBU Technical Leader(s) and FBU Manager.
- 2.5.3 Shall maintain all authorization memoranda and training documents in technical training file for each Trainee.

## **2.6 External Instructors**

- 2.6.1 Instructors that are external to the DFS will be evaluated and approved, based on their knowledge and experience of the subject matter of instruction, by the FBU Technical Leader(s) and the DFS Training Manager, as applicable.

### **3.0 DFS Orientation and Introduction**

#### **3.1 Objectives:**

- 3.1.1 Familiarize the FBU Trainee with the general operation and organization of the DFS. The Trainee will have an understanding of the expectations of the Forensic Biology Unit Training Program, quality issues relevant to laboratory operations, and ethical and professional responsibilities of the position. A training plan will be developed for each FBU Trainee based on a review of background and experience.
- 3.1.2 The FBU Trainee should have orientation/training in the following:
  - 3.1.2.1 Attend DCHR New Employee Orientation
  - 3.1.2.2 Attend DFS Onboarding Training
  - 3.1.2.3 Receive information relating to Union Representation (where applicable)
  - 3.1.2.4 Meet with Agency Director (scheduled through Management)
- 3.1.3 The Trainee should have an understanding of the overall structure of the DFS, FSL, and FBU. Topics will include but are not limited to the following:
  - 3.1.3.1 DFS Organizational Overview (Onboarding)
  - 3.1.3.2 Performance Evaluation/ Expectations (Supervisor)
  - 3.1.3.3 Overview/Tour of the Consolidated Forensic Laboratory (CFL)
- 3.1.4 The FBU Trainee should have an understanding of the practices and procedures of the Quality Assurance Program in place at the DFS. Topics include, but are not limited to, the following:
  - 3.1.4.1 Laboratory accreditation and the quality assurance system
  - 3.1.4.2 Review of DFS Quality Manuals to include: Quality Assurance Manuals (QAMs), Department Operations Manuals (DOMs), Laboratory Operations Manuals (LOMs), and Standard Operating Procedures (SOPs) for FBU
  - 3.1.4.3 Review and discussion with Trainer on FBU SOPs and quality documents that relate to FBU
- 3.1.5 The FBU Trainee should have an understanding of the ethical and professional responsibilities for FBU analysts/technicians/laboratory support personnel to include:
  - 3.1.5.1 Professionalism
  - 3.1.5.2 Competency and Proficiency
  - 3.1.5.3 Clear Communications

### **3.2 Reading Material:**

- 3.2.1 Quality Assurance Manuals (QAMs), Department Operations Manuals (DOMs), Laboratory Operations Manuals (LOMs), Standard Operating Procedures (SOPs) for Forensic Biology and current DFS administrative policies. Refer to the FBU required readings checklist for additional reading material (<X:\Training\FBU Required Reading Documents>).

### **3.3 Study/Discussion Questions:**

- 3.3.1 What is forensic science?
- 3.3.2 Describe the main services of each unit within the FSL.
- 3.3.3 The FSL quality system is represented by which three main documents?
- 3.3.4 Describe ethical and professional responsibilities in the forensic community.

### **3.4 Practical Exercises/Skills:**

- 3.4.1 The FBU Trainee should automatically receive information pertaining to Objective 3.1.2 as a new employee. If the Trainee has not received the information outlined in Objective 3.1.2 **within the first two weeks of employment**, they should notify their first line supervisor.
- 3.4.2 The FBU Manager will conduct, or appoint a member of the staff, to meet with the Trainee to ensure the training outlined in Objectives 3.1.3 - 3.1.5 have been met.
- 3.4.3 The FBU Trainee will meet with the FBU Technical Leader(s), and, as applicable, the FBU Training Coordinator, FBU Manager and/or DFS Training Manager, to discuss prior forensic biology experience and educational background.

### **3.5 Demonstration of Competency:**

- 3.5.1 None

### **3.6 Documentation:**

- 3.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 3.0 Checklist- DFS Orientation and Introduction".

## MODULE 3.0 CHECKLIST

### DFS Orientation and Introduction

Trainee:	Trainer:	Job Title:
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#### READING MATERIAL

	Trainee Initials & Date
Trainee has read all the required readings for Module 3.0.	

#### STUDY/DISCUSSION QUESTIONS

	Trainee Initials & Date
Trainee has the ability to answer study/discussion questions for Module 3.0.	

#### TRAINING OVERVIEW

	Trainee Initials & Date
Trainee has completed onboarding training.	
Trainee has completed tour of the Consolidated Forensic Laboratory (CFL) and received introduction to forensic disciplines within the Forensic Science Laboratory (FSL).	
Trainee has provided emergency contact information to supervisor.	
Trainee has been introduced to the facility and personnel.	
Trainee has reviewed the organization and management structure.	
Trainee has reviewed the relevant job description.	
Trainee has received information related to Union (where applicable).	
The goals of the training program have been explained.	
An assessment of Trainee's previous training, experience and education was conducted; ITP has been completed.	
Trainee has met with Agency Director.	
Trainee has received an overview of the Quality Assurance program	
Trainee has received Qualtrax login information.	
Trainee has received LIMS login information and card, if applicable.	
Trainee has received FBU Keys and/or Iris Scan Access, if applicable	

#### DOCUMENTATION PROVIDED

	Trainee Initials & Date										
Trainee has provided the FBU Training Coordinator and FBU Technical Leader(s) with the following:											
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 10px;"></td><td>College Transcript(s)</td></tr> <tr><td></td><td>Curriculum Vitae</td></tr> <tr><td></td><td>Documentation of employment start date</td></tr> <tr><td></td><td>Training Records</td></tr> <tr><td></td><td>Continuing education certificates</td></tr> </table>		College Transcript(s)		Curriculum Vitae		Documentation of employment start date		Training Records		Continuing education certificates	
	College Transcript(s)										
	Curriculum Vitae										
	Documentation of employment start date										
	Training Records										
	Continuing education certificates										

Signatures below represent successful completion of Training Module 3.0.

\_\_\_\_\_  
Trainee Date

\_\_\_\_\_  
Trainer Date

\_\_\_\_\_  
FBU Technical Leader Date



## 4.0 Quality Assurance Program

### 4.1 Objectives:

- 4.1.1 Quality performance, conforming to recognized standards of good practices both in the field and in the laboratory, is the most important goal within the D.C. Department of Forensic Sciences (DFS). As new and improved methods of analyses are developed to meet the expanding needs of the criminal justice and public health systems, it is essential for quality standards to progress in parallel. The DFS is committed to diligently implementing policy and procedure changes to ensure quality in all facets of DFS operations.

### 4.2 Reading Material:

- 4.2.1 [Quality Management System Standards in Forensics: An Executive Overview](#)
- 4.2.2 [QA/QC What-When-How](#)
- 4.2.3 [Quality Assurance and Quality Control in Evidence Collection and Laboratory Analysis](#)
- 4.2.4 [Chapter 4: Quality Assurance](#)
- 4.2.5 [Quality Assurance \(QA\) vs Quality Control \(QC\)](#)
- 4.2.6 Open up the Qualtrax program, locate and read **DOM07** - Procedures for Quality Corrective Actions (Document Control Number 1275) and **DOM08** - Procedures for Quality Preventive Actions (Document Control Number 1277).
- 4.2.7 Open up Qualtrax program, locate and read the **DFS Quality Policy Statement** (Document Control Number 4864).

### 4.3 Study/Discussion Questions:

- 4.3.1 Define Quality Assurance.
- 4.3.2 What is a Quality Assurance Program?
- 4.3.3 Why do laboratories need a Quality Assurance Program?
- 4.3.4 What is an Audit?
- 4.3.5 What is the difference between Quality Assurance and Quality Control?
- 4.3.6 Do you need to log into Qualtrax with your user ID and password to view documents?

### 4.4 Practical Exercises/Skills:

- 4.4.1 The Trainee will receive instruction and demonstration from a member of the Quality unit in the use of Qualtrax, the quality document control system. This may be completed by a series of lectures/presentations and hands-on exercises. Trainee will record notes in training notebook.
- 4.4.2 Under DFS there are three (3) Divisions; navigate Qualtrax and determine the names of the Units under the Division you are assigned to.

### 4.5 Demonstration of Competency:

- 4.5.1 None

### 4.6 Documentation:

- 4.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 4.0 Checklist – Quality Assurance Program".

## MODULE 4.0 CHECKLIST Quality Assurance Program

Trainee:	Trainer:	Job Title:
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### READING MATERIAL

	Trainee Initials & Date	Trainer Initials & Date
Trainee has read all the required readings for Module 4.0.		

### STUDY/DISCUSSION QUESTIONS

	Trainee Initials & Date
Trainee has answered all study/discussion questions for Module 4.0, listed them in training binder, and Trainer has reviewed the answers for accuracy.	

### PRACTICAL EXERCISES/SKILLS

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the practical exercises in Module 4.0, noted the results in their training binder and results were reviewed by the Trainer for accuracy.		

Signatures below represent successful completion of Training Module 4.0.

\_\_\_\_\_  
Trainee Date

\_\_\_\_\_  
Trainer Date

\_\_\_\_\_  
FBU Technical Leader Date

## **5.0 Laboratory Safety and Evidence Handling**

### **5.1 Objectives:**

- 5.1.1 To develop and demonstrate an understanding of the different hazards that may be encountered while working in the FBU.
- 5.1.2 To understand case log activities, evidence receipt and return.
- 5.1.3 To understand the physical evidence handling procedures, sample packaging, sample storage, chain of custody transfer of evidence and documentation.

### **5.2 Reading Material:**

- 5.2.1 Refer to the FBU required readings checklist for reading material (<X:\Training\FBU Required Reading Documents>).

### **5.3 Study/Discussion Questions:**

- 5.3.1 Describe the proper protective equipment (PPE) worn while working in the FBU laboratory.
- 5.3.2 What are the common routes of exposure to infectious diseases?
- 5.3.3 What types of infectious diseases and/or biological hazards may you encounter while working in the FBU?
- 5.3.4 What is the laboratory policy on reporting health and safety incidents?
- 5.3.5 What is the waste removal process for general lab, biohazard, and hazardous wastes?
- 5.3.6 What are the minimum requirements for a proper seal?
- 5.3.7 What must be included for each entry in the internal DFS chain of custody?
- 5.3.8 When receiving evidence for inventory and/or analysis what are the minimum labeling requirements for the outer container?
- 5.3.9 Describe the procedures and practices that are used in the laboratory in order to decrease or prevent the occurrence of sample contamination.
- 5.3.10 How are DNA extracts stored in the FBU?
- 5.3.11 Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the Trainee's understanding of topics covered in this module. It is the discretion of the Trainee to answer questions for their training binder.

### **5.4 Practical Exercises/Skills:**

- 5.4.1 Review the DFS Health and Safety Training Program and complete Safety Level 1 and Safety Level 2.
- 5.4.2 Complete FBU Laboratory Safety walk-through, to include, but not limited to, the following:
  - 5.4.2.1 Evacuation process from the facility, including the evacuation routes and meeting place

- 5.4.2.2 Locations of fire extinguishers in laboratory, office area, and common areas. Discuss use of fire extinguishers
  - 5.4.2.3 Provide phone numbers for emergency situations/show the location of phone numbers listed in the laboratory
  - 5.4.2.4 Locations of First Aid Kits in the laboratory and office areas
  - 5.4.2.5 Health and safety incident reporting
  - 5.4.2.6 Location of safety equipment, i.e. safety showers, eye wash stations, PPE, fume hoods
  - 5.4.2.7 Discuss the proper use of PPE
  - 5.4.2.8 Location of the Safety Data Sheets (SDS)
  - 5.4.2.9 Waste removal process for general lab, biohazard, and hazardous wastes
- 5.4.3 Observe qualified individuals requesting/receiving evidence from the Central Evidence Unit (CEU) and understand the procedure, chain of custody documentation/LIMS and evidence examination request forms.
- 5.4.4 Understand the standards for evidence packaging to include requirements of seals, labels, and package integrity.
- 5.4.5 Observe qualified individuals examining a variety of types of evidence, taking note of the practices used to decrease or prevent the occurrence of item/sample contamination
- 5.4.6 Receive instruction and demonstration from qualified individual(s) regarding the consumption of evidence and retention of DNA extracts and PCR products. Understand the procedures and policies regarding storage and retention of DNA extracts and PCR products. Understand procedures and policies regarding the consumption of evidence.

## **5.5 Demonstration of Competency:**

- 5.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in Training Binder, and the Trainer has reviewed for accuracy and meeting the objectives of the exercise(s). Successful completion of Safety Level 1 and 2 trainings.

## **5.6 Documentation:**

- 5.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 5.0 Checklist- Laboratory Safety and Evidence Handling".

## MODULE 5.0 CHECKLIST

### Laboratory Safety and Evidence Handling

Trainee:	Trainer:	Job Title:
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#### READING MATERIAL

	Trainee Initials & Date	Trainer Initials & Date
Trainee has read all the required readings for Module 5.0.		

#### STUDY/DISCUSSION QUESTIONS

	Trainee Initials & Date
Trainee has the ability to answer study/discussion questions for Module 5.0.	

#### PRACTICAL EXERCISES/SKILLS

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the practical exercises in Module 5.0, noted the results in their training binder, and results were reviewed by the Trainer for accuracy.		

#### HEALTH AND SAFETY

	Trainee Initials & Date	Health & Safety Officer Initials & Date
Trainee has provided records of hepatitis vaccinations and/or titer or waiver.		
Signed up for Medical Surveillance or opted out.		
Completed Health and Safety Training Level 1.		
Completed Health and Safety Training Level 2.		

Signatures below represent successful completion of Training Module 5.0.

\_\_\_\_\_  
Trainee Date

\_\_\_\_\_  
Trainer Date

\_\_\_\_\_  
FBU Technical Leader Date

## **6.0 Introduction to Casework Documentation**

### **6.1 Objectives:**

- 6.1.1 Have a basic understanding of general casework documentation, organization and content, which should include, but is not limited to: note taking, case file and core binder documentation.

### **6.2 Reading Material:**

- 6.2.1 Refer to the FBU required readings checklist for reading material ([X:\Training\FBU Required Reading Documents](#)).

### **6.3 Study/Discussion Questions:**

- 6.3.1 What are the requirements for analytical note taking?
- 6.3.2 What documents are contained in the FBU core binders?
- 6.3.3 What documents are contained in FBU case files?
- 6.3.4 Discuss how the documents are organized within FBU case files.
- 6.3.5 Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the Trainees understanding of topics covered in this module.

### **6.4 Practical Exercises/Skills:**

- 6.4.1 Understand general casework documentation, organization and content by obtaining and reviewing various case files and core binders. Types of cases should include: Serology only (if available), Serology and DNA with/without statistics, DNA only with/without statistics, and Discontinuation of Analysis. Obtain copies of analyst/technician notes, as applicable, to study and refer to if necessary.
- 6.4.2 Understand general reporting format. Obtain and review copies of various types of reports to refer to if necessary. Types of reports of cases should include: Serology only (if available), DNA and Serology with/without statistics, DNA only with/without statistics, Discontinuation of Analysis, CODIS Notification.
- 6.4.3 Note: Throughout the training program, the Trainee is expected to gather case notes and reports of qualified individuals to use as examples for learning how to take case notes and write reports of their own. Reviews and any questions regarding developing casework documentation should be discussed with Trainer(s). As Trainees progress through training, their knowledge and ability to work independently with case notes, report writing and conducting reviews should increase.

### **6.5 Demonstration of Competency:**

- 6.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in training binder, and the

Trainer has reviewed for accuracy and meeting the objectives of the exercise(s).  
The Trainer(s) may also sign off on the module by oral discussion/proof of understanding of the material by the Trainee.

## **6.6 Documentation:**

- 6.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 6.0 Checklist- Introduction to Casework Documentation".



## MODULE 6.0 CHECKLIST

### Introduction to Casework Documentation

Trainee:	Trainer:	Job Title:
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#### READING MATERIAL

	Trainee Initials & Date	Trainer Initials & Date
Trainee has read all the required readings for Module 6.0.		

#### STUDY/DISCUSSION QUESTIONS

	Trainee Initials & Date
Trainee has the ability to answer study/discussion questions for Module 6.0.	

#### PRACTICAL EXERCISES/SKILLS

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the practical exercises in Module 6.0, noted the results in their training binder and/or provided oral discussion/proof of understanding of the material to the Trainer.		

Signatures below represent successful completion of Training Module 6.0.

\_\_\_\_\_  
Trainee Date

\_\_\_\_\_  
Trainer Date

\_\_\_\_\_  
FBU Technical Leader Date

## **7.0 Technical / Administrative Review**

### **7.1 Objectives:**

- 7.1.1 To develop and demonstrate an understanding of how to properly conduct administrative and/or technical reviews in accordance with the requirements of the Forensic Science Laboratory (FSL) Quality Assurance Manual (QAM) and the FBI QAS.

### **7.2 Reading Material:**

- 7.2.1 Refer to the FBU required reading checklist for reading material ([X:\Training\FBU Required Reading Documents](#)).

### **7.3 Study/Discussion Questions:**

- 7.3.1 Define administrative review.
- 7.3.2 What are the QAS requirements for administrative and technical review?
- 7.3.3 Who is authorized to conduct an administrative review?
- 7.3.4 Define technical review.
- 7.3.5 Who is authorized to conduct a technical review?
- 7.3.6 What review(s) must be performed for a “Report of Examination”, “Discontinuation of Analysis”, and “CODIS Notification” report?
- 7.3.7 Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the Trainees understanding of topics covered in this module.

### **7.4 Practical Exercises/Skills:**

- 7.4.1 Receive instruction and demonstration from a qualified individual(s) in the administrative and/or technical review process of casework reports and documents in accordance with laboratory policy. This may be completed by a series of lectures/presentations and hands-on exercises. Trainee will record notes in training notebook.
- 7.4.2 As applicable, Trainee must conduct 3 – 5 supervised administrative reviews on case files and documents consisting of various types and complexities routinely performed by the FBU. Reviews will be documented on the “Supervised Technical/Administrative Review Worksheet” (Document Control Number 13202).
- 7.4.3 As applicable, Trainee must conduct 5 - 10 supervised technical reviews on case files and core binders consisting of various types and complexities routinely performed by FBU. Reviews will be documented on the “Supervised Technical/Administrative Review Worksheet” (Document Control Number 13202).
- 7.4.4 Note: Throughout the training program, the Trainee is expected to gather case notes and reports of qualified individuals to use as examples for learning how to take case notes and write reports of their own. Throughout the training program, the Trainee should also use reports for practice on technical and administrative

reviews. Reviews and any questions regarding developing case notes, writing reports, and the technical and administrative review process should be discussed with Trainer(s). As Trainees progress through training, their knowledge and ability to work independently with case notes, report writing and conducting reviews should increase.

## **7.5 Demonstration of Competency:**

- 7.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in Training Binder, and the Trainer has reviewed for accuracy and meeting the objectives of the exercise(s).
- 7.5.2 The Trainee must successfully complete an unsupervised administrative review competency test prior to approval to perform independent administrative reviews.
- 7.5.3 The Trainee must successfully complete an unsupervised technical review competency test prior to approval to perform independent technical reviews.

## **7.6 Documentation:**

- 7.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 7.0 Checklist- Technical / Administrative Review".

## MODULE 7.0 CHECKLIST

### Technical / Administrative Review

Trainee:	Trainer:	Job Title:
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#### READING MATERIAL

	Trainee Initials & Date	Trainer Initials & Date
Trainee has read all the required readings for Module 7.0.		

#### STUDY/DISCUSSION QUESTIONS

	Trainee Initials & Date
Trainee has the ability to answer study/discussion questions for Module 7.0. or [Trainee has answered all study/discussion questions for Module 7.0, listed them in training binder, and Trainer has reviewed the answers for accuracy.]	

#### PRACTICAL EXERCISES/SKILLS

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the practical exercises for administrative review in Module 7.0, noted the results in their training binder, and results were reviewed by the Trainer for accuracy.		
Trainee has successfully completed the practical exercises for technical review in Module 7.0, noted the results in their training binder, and results were reviewed by the Trainer for accuracy.		

#### COMPETENCY TEST

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the administrative review competency test for Module 7.0.		
Trainee has successfully completed the technical review competency test for Module 7.0.		

Signatures below represent successful completion of Training Module 7.0.

\_\_\_\_\_  
Trainee Date

\_\_\_\_\_  
Trainer Date

\_\_\_\_\_  
FBU Technical Leader Date

## **8.0 Blood Identification**

### **8.1 Objectives:**

- 8.1.1 To develop and demonstrate an understanding of the principles and practices of presumptive blood testing.
- 8.1.2 The Trainee should have an understanding that will include, but is not limited to, knowledge of the following:
  - 8.1.2.1 The composition of blood (cellular and protein components)
  - 8.1.2.2 The mechanism and theory of the presumptive blood tests
  - 8.1.2.3 The various methods used to perform presumptive blood testing and when to use them
  - 8.1.2.4 Types of confirmatory blood tests
  - 8.1.2.5 Comparison and contrast between presumptive and confirmatory blood testing
  - 8.1.2.6 Sources and recognition of false positive reactions
  - 8.1.2.7 Sensitivity, specificity and limitations of the presumptive tests
  - 8.1.2.8 Technical performance of presumptive blood testing in use by the DFS FBU
  - 8.1.2.9 Reagent preparation and quality control of reagents

### **8.2 Reading Material:**

- 8.2.1 Refer to the FBU required readings checklist for reading material (<X:\Training\FBU Required Reading Documents>).

### **8.3 Study/Discussion Questions:**

- 8.3.1 What is blood? List the components of blood.
- 8.3.2 Describe the chemical reaction of the phenolphthalein test.
- 8.3.3 What are the limitations of the phenolphthalein test?
- 8.3.4 What is the sensitivity of the phenolphthalein test?
- 8.3.5 What substance(s) can give a false positive for the phenolphthalein test?
- 8.3.6 Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the Trainees understanding of topics covered in this module.

### **8.4 Practical Exercises/Skills:**

- 8.4.1 Under supervision by a qualified individual(s), observe the preparation of and/or prepare presumptive blood test reagents and review related quality control procedures (Phenolphthalin Stock and Working Solutions). On the 30-Day Progress Report (Document Control Number 7496) record the following: reagent observed and/or prepared, quality control procedure(s) observed and/or performed, qualified individual(s) observed, date of observation.

- 8.4.2 Receive instruction and demonstration by a qualified analyst(s) in body fluid identification. This may be completed by a series of lectures/presentations and hands-on exercises. Topics that will be covered include, but are not limited to, the following:
  - 8.4.2.1 Case approach of biological screening examinations of evidentiary items
  - 8.4.2.2 How to select, sample, prioritize and document stains/samples for collection based on factors such as: staining size/concentration, stain grouping, excessive staining and results of presumptive testing
  - 8.4.2.3 Methods of sampling an item for serology and/or DNA analysis: sample cutting, scraping (and the procedure for cleaning cutting/scraping tools) and swabbing item(s) for collection of biological material
  - 8.4.2.4 Composition of biological fluids (e.g., blood)
  - 8.4.2.5 Presumptive & confirmatory testing of biological fluids
  - 8.4.2.6 Evidence examination quality assurance/quality control practices
- 8.4.3 Observe a qualified analyst(s) perform the presumptive testing using the methods outlined in the laboratory's Forensic Biology Unit Standard Operating Procedures (FBSOPs) on a minimum of 5 cases. Observe and review casework note-taking and documentation. Record the following on 30-Day Progress Report (Document Control Number 7496): case number, qualified analyst(s) observed, date of observation, type of exam and number of items.
- 8.4.4 Demonstrate the techniques to the Trainer by performing the following experiments. Record results on the "serology exam training worksheet" (Document Control Number 10453) (as appropriate and take notes according to laboratory protocol. Trainer should observe Trainee perform presumptive testing at least once, prior to Trainee proceeding to independent exercises.
- 8.4.5 Sensitivity Tests
  - 8.4.5.1 Obtain these previously prepared training samples:
    - 8.4.5.1.1 A fresh blood sample, which has been prepared as a doubling dilution series ranging from neat to 1:2048
      - 8.4.5.1.1.1 25 µL of each dilution should be spotted onto various substrates; substrates may include: sterile filter paper, white cotton cloth (3 sets), dark blue denim cloth, non-porous surface (i.e., ceramic spotting plate)
      - 8.4.5.1.1.2 100 µL of each dilution should be spotted on to sterile cotton swabs
      - 8.4.5.1.1.3 Allow all samples to dry overnight at room temperature. After drying, wash one white cotton cloth set with detergent and wash one white cotton cloth set with bleach and detergent
  - 8.4.5.2 Visually examine each stain under standard lighting, as well as with an alternate light source (ALS); record observations.

- 8.4.5.3 Perform presumptive testing on each stain using each testing method (filter paper, cuttings, swabbing) as outlined in the laboratory's FBSOPs.
- 8.4.5.4 If available, obtain various aged bloodstains on various substrates as well as environmentally challenged samples and perform testing on each stain using the methods outlined in the laboratory's FBSOPs. Samples used may be comprised of mock case samples, retained proficiency samples or non-probative case samples.
- 8.4.6 Specificity Tests
  - 8.4.6.1 Obtain these previously prepared training samples:
    - 8.4.6.1.1 Body fluid kit, including but not limited to the following samples: oral, vaginal, rectal, urine, semen and breast milk
    - 8.4.6.1.2 If available, animal blood stains including but not limited to the following samples: cat and dog
    - 8.4.6.1.3 Food stains including but not limited to the following samples: horseradish and ketchup
    - 8.4.6.1.4 Sample containing rust, i.e., rusty tool, knife, etc.
  - 8.4.6.2 Visually examine each stain under standard lighting, as well as with an alternate light source (ALS); record observations.
  - 8.4.6.3 Perform presumptive testing on each stain as outlined in the laboratory's FBSOPs. Record testing method (filter paper, cuttings, swabbing) used.
- 8.4.7 Perform serology examinations (visual examination, presumptive testing) on a minimum of 5-15 training samples, representative of samples routinely encountered in casework, (to include non-probative, retained proficiency test samples and/or mock case samples). Use methods outlined in the laboratory's FBSOPs. Samples will be given as training case sample sets. Document on the 30-Day Progress Report (Document Control Number 7496) form. Trainer must observe Trainee perform serology examinations at least once, prior to Trainee proceeding to independent exercises. Each case sample set should be reviewed and approved by Trainer prior to proceeding to next case sample set.
- 8.4.8 Note: Throughout the training program, the Trainee is expected to gather case notes and reports of analysts to use as examples for learning how to take case notes and write reports of their own. Throughout the training program, the Trainee should also use reports for practice on technical and administrative reviews. Reviews and any questions regarding developing case notes, writing reports, and the technical and administrative review process should be discussed with Trainer(s). As Trainees progress through training, their knowledge and ability to work independently with case notes, report writing and conducting reviews should increase.

## 8.5 Demonstration of Competency:

- 8.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in Training Binder, and the Trainer has reviewed for accuracy and meeting the objectives of the exercise(s).
- 8.5.2 The Trainee must successfully complete an unsupervised competency test, which may be performed in conjunction with other qualifying tests.
- 8.5.3 The Trainee shall successfully complete an oral board, addressing in detail the following: the composition of blood, how to test for the presence of blood, and specifics on presumptive and confirmatory tests. If applicable to Trainee's duties, interpretation and reporting of examination results according to DFS Forensic Science Laboratory policy may also be addressed in the oral board.

**8.6 Documentation:**

- 8.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 8.0 Checklist- Blood Identification."



## MODULE 8.0 CHECKLIST

### Blood Identification

Trainee:	Trainer:	Job Title:
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#### READING MATERIAL

	Trainee Initials & Date	Trainer Initials & Date
Trainee has read all the required readings for Module 8.0.		

#### STUDY/DISCUSSION QUESTIONS

	Trainee Initials & Date
Trainee has the ability to answer study/discussion questions for Module 8.0.	

#### PRACTICAL EXERCISES/SKILLS

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the practical exercises in Module 8.0, noted the results in their training binder and results were reviewed by the Trainer for accuracy.		

#### COMPETENCY TEST

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the competency test for Module 8.0, (passing score of 80% or greater for written exams).		

#### ORAL BOARD

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the oral board for Module 8.0.		

Signatures below represent successful completion of Training Module 8.0.

\_\_\_\_\_  
Trainee Date

\_\_\_\_\_  
Trainer Date

\_\_\_\_\_  
FBU Technical Leader Date

## **9.0 Semen Identification**

### **9.1 Objectives:**

- 9.1.1 To develop and demonstrate an understanding of the principles and practices of presumptive and confirmatory semen tests.
- 9.1.2 The Trainee should have an understanding that will include, but is not limited to, knowledge of the following:
  - 9.1.2.1 The composition of semen (cellular and protein components).
  - 9.1.2.2 The mechanism and theory of the presumptive and confirmatory semen tests.
  - 9.1.2.3 The various techniques used to perform presumptive and confirmatory tests and when to use them.
  - 9.1.2.4 Sources and recognition of false positive reactions.
  - 9.1.2.5 Sensitivity, specificity and limitations of the presumptive and confirmatory tests.
  - 9.1.2.6 Technical performance of presumptive and confirmatory tests for the presence of semen in use at the DFS Forensic Science Laboratory.
  - 9.1.2.7 Reagent preparation and quality control of reagents.
  - 9.1.2.8 Factors that may affect the number of spermatozoa in a human ejaculate.
  - 9.1.2.9 Persistence of spermatozoa under different environmental conditions (i.e., storage, vaginal tract) and how this differs from the persistence of acid phosphatase.
  - 9.1.2.10 Human spermatozoa morphology.
  - 9.1.2.11 Why sperm exhibit differential staining and what it looks like.
  - 9.1.2.12 Functions of the "Christmas Tree" stain reagents.

### **9.2 Reading Material:**

- 9.2.1 Refer to the FBU required readings checklist for reading material ([X:\FBU Required Reading Documents](#)).

### **9.3 Study/Discussion Questions:**

- 9.3.1 Describe the difference between presumptive and confirmatory testing.
- 9.3.2 What is semen? List the components of semen
- 9.3.3 How long are the semen components detected in the body after deposition?
- 9.3.4 What are the limitations of the semen presumptive and confirmatory tests?
- 9.3.5 What is the sensitivity of the semen presumptive and confirmatory tests?
- 9.3.6 Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the Trainees understanding of topics covered in this module.

## 9.4 Practical Exercises/Skills:

- 9.4.1 Under supervision by a qualified individual(s), observe the preparation of and/or prepare presumptive and confirmatory semen tests reagents and review related quality control procedures (Acid Phosphatase Reagent, P30 Antigen Cards, Christmas Tree Stain Reagents). On the 30-Day Progress Report form (Document Control Number 7496), record the following: reagent observed and/or prepared, quality control procedure(s) observed and/or performed, qualified individual(s) observed, date of observation.
- 9.4.2 Receive instruction and demonstration by a qualified analyst(s) in body fluid identification. This may be completed by a series of lectures/presentations and hands-on exercises. Topics that will be covered include, but are not limited to, the following:
  - 9.4.2.1 Case approach of biological screening examinations of evidentiary items
  - 9.4.2.2 How to select, sample, prioritize and document stains/samples for collection based on factors such as: staining size/concentration, stain grouping, excessive staining and results of presumptive/confirmatory testing
  - 9.4.2.3 Methods of sampling an item for serology and/or DNA analysis: sample cutting, scraping (and the procedure for cleaning cutting/scraping tools) and swabbing item(s) for collection of biological material
  - 9.4.2.4 Composition of biological fluids (e.g., semen)
  - 9.4.2.5 Presumptive & confirmatory testing of biological fluids
  - 9.4.2.6 Evidence examination quality assurance/quality control practices
- 9.4.3 Observe a qualified analyst(s) perform the presumptive and confirmatory tests using the methods outlined in the laboratory FBSOPs on a minimum of 5 cases. Observe and review casework note-taking and documentation. On the 30-Day Progress Report (Document Control Number 7496), record the following: case number, qualified analyst(s) observed, date of observation, type of exam and number of items.
- 9.4.4 Demonstrate the techniques to the Trainer by performing the following experiments. Record results on the “serology exam training worksheet” (Document Control Number 10453) as appropriate and take notes according to laboratory protocol. Trainer must observe Trainee perform the presumptive and confirmatory tests at least once, prior to Trainee proceeding to independent exercises:
  - 9.4.4.1 Sensitivity Tests
    - 9.4.4.1.1 Obtain these previously prepared training samples:
      - 9.4.4.1.1.1 Fresh semen sample, which has been prepared as a doubling dilution series ranging from neat to 1:2049.
        - 9.4.4.1.1.1.1 25 µL of each dilution should be spotted onto various substrates; substrates may include: sterile

- filter paper, white cotton cloth (3 sets), dark blue denim cloth).
      - 9.4.5.1.1.1.2 100 µL of each dilution should be spotted onto sterile cotton swabs.
      - 9.4.5.1.1.1.3 Allow all samples to dry overnight at room temperature.
      - 9.4.5.1.1.1.4 After drying, wash one white cotton cloth set with detergent and wash one white cotton cloth set with bleach and detergent.
    - 9.4.4.1.2 Visually examine each stain under standard lighting, as well as with an alternate light source (ALS); record observations.
    - 9.4.4.1.3 Perform presumptive tests on each stain using each testing method (filter paper, cuttings/direct, etc.) as outlined in the laboratory's FBSOPs.
    - 9.4.4.1.4 Perform confirmatory tests, excluding microscopic confirmatory test, on each stain of the unwashed white cotton cloth and sterile cotton swabs, as outlined in the laboratory's FBSOPs.
    - 9.4.4.1.5 If available, obtain various aged semen stains on various substrates and environmentally challenged samples and perform presumptive and confirmatory tests on each stain using the methods outlined in the laboratory's FBSOPs. Samples used may be comprised of mock case samples, retained proficiency samples or non-probative case samples.
  - 9.4.4.2 Specificity Tests
    - 9.4.4.2.1 Obtain these previously prepared training samples:
      - 9.4.4.2.1.1 Body fluid kit, including but not limited to the following samples: oral, vaginal, rectal, urine, semen and breast milk.
      - 9.4.6.2.1.2 If available, animal semen stains including but not limited to the following samples: cat, dog and ferret.
      - 9.4.6.2.1.3 Food stains including but not limited to the following samples: sweet potato and cauliflower.
    - 9.4.4.2.2 Visually examine each stain under standard lighting, as well as with an alternate light source (ALS), record observations.
    - 9.4.4.2.3 Perform presumptive and confirmatory tests, excluding microscopic confirmatory test, on each stain as outlined in

the laboratory's FBSOPs. Record sampling technique(s) used.

#### 9.4.4.3 Microscopic Evaluation of Spermatozoa

9.4.4.3.1 Obtain these previously prepared training samples:

9.4.4.3.1.1 Body fluid kit (semen free): oral, vaginal, rectal.

9.4.4.3.1.2 Samples with semen: oral, vaginal, rectal.

9.4.4.3.1.2.1 These samples may be prepared from the semen free body fluid kit swabs by inoculating them with semen.

9.4.4.3.1.3 If available, vaginal yeast and bacteria samples. If available, vasectomized human semen sample, dog semen, primate semen and other animal samples (if available).

9.4.4.3.1.4 If needed, make smear slides of each sample using methods outlined in the laboratory's FBSOPs.

9.4.4.4 Perform microscopic evaluation of each sample using methods outlined in the laboratory's FBSOPs. Record observations.

9.4.4.5 Using a neat human semen sample, prepare and view both a stained and unstained slide, noting structural morphology.

9.4.5 Perform serology examinations (visual examination, presumptive and/or confirmatory testing) on a minimum of 5-15 training samples, representative of samples routinely encountered in casework, (to include non-probative, retained proficiency test samples and/or mock case samples). Use methods outlined in the laboratory's FBSOPs. Samples will be given as training case sample sets. Document on the 30-Day Progress Report (Document Control Number 7496). Trainer must observe Trainee perform serology examinations at least once, prior to Trainee proceeding to independent exercises. Each case sample set should be reviewed and approved by Trainer prior to proceeding to next case sample set.

9.4.6 Note: Throughout the training program, the Trainee is expected to gather case notes and reports of analysts to use as examples for learning how to take case notes and write reports of their own. Throughout the training program, the Trainee should also use reports for practice on technical and administrative reviews. Reviews and any questions regarding developing case notes, writing reports, and the technical and administrative review process should be discussed with Trainer(s). As Trainees progress through training, their knowledge and ability to work independently with case notes, report writing and conducting reviews should increase.

### 9.5 Demonstration of Competency:

- 9.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in Training Binder, and the Trainer has reviewed for accuracy and meeting the objectives of the exercise(s).
- 9.5.2 The Trainee must successfully complete an unsupervised competency test which may be performed in conjunction with other qualifying tests.
- 9.5.3 The Trainee must successfully complete an oral board, addressing in detail the following: the composition of semen, how to test for the presence of semen, and specifics on presumptive and confirmatory tests. If applicable to Trainee's duties, interpretation and reporting of examination results according to DFS Forensic Science Laboratory policy may be addressed in the oral board.

**9.6 Documentation:**

- 9.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 9.0 Checklist- Semen Identification."

## MODULE 9.0 CHECKLIST Semen Identification

Trainee:	Trainer:	Job Title:
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### READING MATERIAL

	Trainee Initials & Date	Trainer Initials & Date
Trainee has read all the required readings for Module 9.0.		

### STUDY/DISCUSSION QUESTIONS

	Trainee Initials & Date
Trainee has the ability to answer study/discussion questions for Module 9.0.	

### PRACTICAL EXERCISES/SKILLS

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the practical exercises in Module 9.0, noted the results in their training binder and results were reviewed by the Trainer for accuracy.		

### COMPETENCY TEST

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the competency test for Module 9.0 (passing score of 80% or greater for written exams).		

### ORAL BOARD

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the oral board for Module 9.0.		

Signatures below represent successful completion of Training Module 9.0.

\_\_\_\_\_  
Trainee Date

\_\_\_\_\_  
Trainer Date

\_\_\_\_\_  
FBU Technical Leader Date

## **10.0 DNA Overview**

### **10.1 Objectives:**

- 10.1.1 To demonstrate the basic understanding and historical background of DNA and how it is used in forensic DNA analysis.
- 10.1.2 The Trainee should have an understanding of the principles of DNA and its use in forensics, which will include, but is not limited to, the following:
  - 10.1.2.1 Mendelian genetics
  - 10.1.2.2 Hardy-Weinberg Principle
  - 10.1.2.3 Linkage
  - 10.1.2.4 The basic biochemistry of the DNA molecule and how it applies to forensic biology
  - 10.1.2.5 The general terms and definitions used in the field of forensic DNA analysis
  - 10.1.2.6 The technological history of DNA analysis in the field of forensics
  - 10.1.2.7 The importance of precautionary measures used to prevent sample contamination
  - 10.1.2.8 The utility of databases (CODIS, populations, etc.)
  - 10.1.2.9 The general knowledge of statistical and population genetics used in forensic DNA analysis
  - 10.1.2.10 The knowledge of social, ethical and legal issues surrounding forensic DNA analysis
  - 10.1.2.11 The knowledge of current technological developments in forensic DNA analysis
  - 10.1.2.12 Sample limitations and the utility of substrate controls

### **10.2 Reading Material:**

- 10.2.1 Refer to the FBU required readings checklist for reading material ([X:\Training\FBU Required Reading Documents](#)).

### **10.3 Study/Discussion Questions:**

- 10.3.1 What is DNA? Describe its chemical composition.
- 10.3.2 Describe Mendel's Laws of Heredity.
- 10.3.3 What is Linkage and Linkage equilibrium? How do they differ?
- 10.3.4 Describe the major steps in forensic DNA analysis.
- 10.3.5 Describe the most recent technological developments in forensic DNA analysis.
- 10.3.6 Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the Trainees understanding of topics covered in this module.

### **10.4 Practical Exercises/Skills:**

- 10.4.1 None

### **10.5 Demonstration of Competency:**



- 10.5.1 The Trainee must successfully complete an oral board, addressing in detail the following: *The historical background and principles of DNA and how DNA is used in forensic analysis.*

**10.6 Documentation:**

- 10.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 10.0 Checklist- DNA Overview."

## MODULE 10.0 CHECKLIST DNA Overview

Trainee:	Trainer:	Job Title:
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### READING MATERIAL

	Trainee Initials & Date	Trainer Initials & Date
Trainee has read all the required readings for Module 10.0.		

### STUDY/DISCUSSION QUESTIONS

	Trainee Initials & Date
Trainee has ability to answer study/discussion questions for Module 10.0.	

### ORAL BOARD

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the oral board for Module 10.0.		

Signatures below represent successful completion of Training Module 10.0.

\_\_\_\_\_  
Trainee Date

\_\_\_\_\_  
Trainer Date

\_\_\_\_\_  
FBU Technical Leader Date

## **11.0 DNA Extraction**

### **11.1 Objectives:**

- 11.1.1 To develop and demonstrate an understanding of the principles and practices of DNA extraction and DNA sample collection.
- 11.1.2 As recommended by the Scientific Working Group on DNA Analysis Methods (SWGDM) Training Guidelines, the Trainee must perform nuclear DNA analysis on a number of samples sufficient to demonstrate the Trainee's competency in the laboratory's analytical procedures. To ensure this guideline is satisfied, the Trainee must perform nuclear DNA analysis on a minimum of 50 samples. Samples will consist of various types and complexities to mimic casework samples routinely analyzed by an analyst.
- 11.1.3 The Trainee should have an understanding of the principles of the DNA extraction methods and the techniques used for sample collection from items for DNA analysis, which will include, but is not limited to, the following:
  - 11.1.3.1 The various techniques used to perform the extractions and when it is best to use each type of extraction
  - 11.1.3.2 The preparation, handling and function of the critical reagents, and their components, used in each type of extraction
  - 11.1.3.3 The mechanism and theory of the extraction process
  - 11.1.3.4 The utility of controls
  - 11.1.3.5 The sensitivity, advantages and limitations of DNA extraction methods
  - 11.1.3.6 Contamination issues that may arise during DNA extraction methods and the precautions taken to reduce the potential for contamination
  - 11.1.3.7 Methods of DNA concentration
  - 11.1.3.8 The various techniques of sampling an item for DNA analysis

### **11.2 Reading Material:**

- 11.2.1 Refer to the FBU required readings checklist for reading material (<X:\Training\FBU Required Reading Documents>).

### **11.3 Study/Discussion Questions:**

- 11.3.1 What are the goals of the DNA extraction process?
- 11.3.2 Describe the DNA extraction methods used by FBU.
- 11.3.3 Give an example of when you would use each method.
- 11.3.4 What are the limitations of the DNA extraction procedures used by FBU?
- 11.3.5 What is a reagent blank? Why is it required?
- 11.3.6 Describe the various DNA sample collection techniques used by FBU.
- 11.3.7 Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the Trainees understanding of topics covered in this module.

### **11.4 Practical Exercises/Skills:**

- 11.4.1 **Important Note:** DNA extracts should be retained for use in the subsequent modules
- 11.4.2 Observe a qualified individual(s) perform equipment maintenance and calibration on the extraction instruments. Also observe a qualified individual(s) perform any related quality control procedures (Maintenance of the EZ1 Advanced XL, Maintenance of the QIA Symphony SP, Quality Control of Qiagen DNA Investigator Kits). On the 30-Day Progress Report (Document Control Number 7496), record the following: equipment maintenance, calibration or quality control procedure(s) observed, qualified individual(s) observed, date of observation.
- 11.4.3 Under supervision by a qualified individual(s), observe the preparation of and/or prepare DNA extraction reagents and review related quality control procedures (Digest Buffer, 10mg/ml Proteinase K, Dithiothreitol). On the 30-Day Progress Report (Document Control Number 7496), record the following: reagent observed and/or prepared, quality control procedure(s) observed and/or performed, qualified individual(s) observed, date of observation.
- 11.4.4 Receive instruction and demonstration by a qualified analyst(s) in DNA extraction. This may be completed by a series of lectures/presentations and hands-on exercises. Topics that will be covered include, but are not limited to, the following:
  - 11.4.4.1 Sample collection for DNA testing (selection, prioritization, sampling techniques, and quantity to consume)
  - 11.4.4.2 DNA extraction methods
  - 11.4.4.3 Function of DNA extraction critical reagents and their components
  - 11.4.4.4 DNA extraction quality assurance/quality control practices
- 11.4.5 Observe a qualified analyst(s)/technician(s) perform DNA sample collection techniques (i.e., cutting, scraping, and swabbing) on various mock case items, to include note-taking.
  - 11.4.5.1 Suggested Items:
    - 11.4.5.1.1 Water bottle
    - 11.4.5.1.2 Soda can
    - 11.4.5.1.3 Cigarette butt
    - 11.4.5.1.4 Fingernail clippings
    - 11.4.5.1.5 Clothing [wearer]
- 11.4.6 Demonstrate the DNA sample collection techniques to the Trainer by performing, under the Trainer's supervision, each technique on various mock case items.
- 11.4.7 Observe a qualified individual(s) perform DNA extractions using the methods outlined in the laboratory FBSOPs on at least 3 batches/runs. Observe and review casework note-taking and documentation. On the 30-Day Progress Report (Document Control Number 7496), record the following: case number/batch number, qualified individual(s) observed, date of observation, type of extraction method used and number of samples.

- 11.4.8 Observe a qualified individual(s) perform concentration of extracted DNA sample(s) using the methods outlined in the laboratory FBSOPs. On the 30-Day Progress Report (Document Control Number 7496), record the following: case number, qualified individual(s) observed, date of observation, type of exam and number of samples.
- 11.4.9 Demonstrate the techniques to the Trainer by performing the following experiments, record results in the Sample Tracking and Control Software (STACS) as appropriate and take notes according to laboratory FBSOPs. Exercises below will be given as training case sample sets (training samples may be batched together). Document on the 30-Day Progress Report (Document Control Number 7496). Trainer must observe Trainee perform robotic and manual extractions at least once and non-differential and differential extractions at least once, prior to Trainee proceeding to independent exercises. Each case/batch set should be reviewed and approved by Trainer prior to proceeding to next case/batch set.
- 11.4.10 Perform non-differential DNA extractions on single source bloodstain samples from at least 5 different individuals following the laboratory's FBSOPs, including blanks. Record extraction method used.
- 11.4.11 Perform differential DNA extractions on at least 5 mixed samples (mixtures containing spermatozoa) following the laboratory's FBSOPs, including blanks. Record extraction method used.
- 11.4.11.1 Suggested Samples:
- 11.4.11.1.1 Semen mixtures of varying high and low concentrations
  - 11.4.11.1.2 Semen mixed with vaginal fluid, saliva, blood or urine
  - 11.4.11.1.3 Diluted semen mixed with vaginal fluid, saliva, blood or urine
  - 11.4.11.1.4 Semen and vaginal fluid mixtures collected with varied post coital collection times
- 11.4.12 Perform non-differential DNA extractions on at least 5 samples containing saliva following the laboratory's FBSOPs, including blanks. Record extraction method used.
- 11.4.12.1 Suggested Samples:
- 11.4.12.1.1 Oral swabs
  - 11.4.12.1.2 Cigarette/cigarette butts
  - 11.4.12.1.3 Envelopes
  - 11.4.12.1.4 Cups/bottles
- 11.4.13 Perform non-differential DNA extractions on at least 5 wearer swabbing samples following the laboratory's FBSOPs, including blanks. Record extraction method used.
- 11.4.13.1 Suggested Samples:

- 11.4.13.1.1 Hat
- 11.4.13.1.2 Glove
- 11.4.13.1.3 Shirt
- 11.4.13.1.4 Sunglasses

- 11.4.14 Perform non-differential DNA extractions on at least 5 mixed samples, mixtures containing no sperm, following the laboratory's FBSOPs, including blanks. Record extraction method used.

11.4.14.1 Suggested Samples:

- 11.4.14.1.1 Mixtures of blood, saliva, urine, vaginal fluid
- 11.4.14.1.2 Diluted mixtures of blood, saliva, urine, vaginal fluid

- 11.4.15 Perform non-differential DNA extractions on at least 3 fingernail samples, following the laboratory's FBSOPs, including blanks. Record extraction method used.

11.4.15.1 Suggested Samples:

- 11.4.15.1.1 Fingernail scrapings
- 11.4.15.1.2 Fingernail swabbings
- 11.4.15.1.3 Fingernail cuttings

- 11.4.16 Perform non-differential DNA extractions on at least 3 different animal samples, following the laboratory's FBSOPs, including blanks. Record extraction method used.

11.4.16.1 Suggested Samples:

- 11.4.16.1.1 Dog
- 11.4.16.1.2 Cat
- 11.4.16.1.3 Bird
- 11.4.16.1.4 Deer
- 11.4.16.1.5 Higher primate (if available)

- 11.4.17 Perform DNA extractions on at least 5 compromised samples (i.e. low level and/or degraded samples expected to produce partial profiles) following the laboratory's FBSOPs, including controls and blanks. Record extraction method used. *(Note: At least 2 samples must contain semen. Perform differential DNA extractions on semen containing samples.)* Concentrate low level samples following the laboratory's FBSOPs, including blanks.

11.4.17.1 Suggested Samples:

11.4.17.1.1 Low level samples:

- 11.4.17.1.1.1 Touch evidence\* (swabbing from pens, pencils, weapons, cars, etc.)
- 11.4.17.1.1.2 Samples diluted by laboratory to mimic low level samples

11.4.17.1.2 Degraded samples:

- 11.4.17.1.2.1 Aged samples
- 11.4.17.1.2.2 Sample subjected to ultraviolet light
- 11.4.17.1.2.3 Sample treated with DNase

11.4.17.1.3 \*May be included under both categories.

11.4.18 Perform DNA extractions on at least 5 inhibited samples (expected to produce at least partial profiles), following the laboratory's FBSOPs, including controls and blanks. Record extraction method used. *(Note: At least 2 samples must contain semen, Perform differential DNA extractions on semen containing samples.)*

11.4.18.1 Suggested Samples:

- 11.4.18.1.1 Stains on denim, leather, or other heavily dyed material
- 11.4.18.1.2 Stains treated with fingerprint developing reagents (ninhydrin, superglue, amido black, coomassie blue, physical developer)
- 11.4.18.1.3 Stains treated with cleaning agents (bleach, detergent)
- 11.4.18.1.4 Stains exposed to fire or mixed with soil

11.4.19 Perform DNA extractions on at least one non-probative adjudicated sexual assault kit or sexual assault kit simulated mock case samples, including associated reference samples, following the laboratory's FBSOPs, including controls and blanks. *(Note: Must contain semen positive samples.)* The analysis data from this exercise may be used in the Trainee's mock trial. Document on the 30-Day Progress Report (Document Control Number 7496).

11.4.20 Note: Throughout the training program, the Trainee is expected to gather case notes and reports of qualified individuals to use as examples for learning how to take case notes and write reports of their own. Throughout the training program, the Trainee should also use reports for practice on technical and administrative reviews. Reviews and any questions regarding developing case notes, writing reports, and the technical and administrative review process should be discussed with Trainer(s). As Trainees progress through training, their knowledge and ability to work independently with case notes, report writing and conducting reviews should increase.

## 11.5 Demonstration of Competency:

- 11.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in Training Binder, and the Trainer has reviewed for accuracy and meeting the objectives of the exercise(s).
- 11.5.2 The Trainee must successfully complete an unsupervised competency test, covering each extraction method to be used in casework, which may be performed in conjunction with other qualifying tests.
- 11.5.3 The Trainee must successfully complete an oral board, addressing in detail the following: The various techniques used to perform DNA extractions and when it

is best to use each type of extraction; the preparation, handling and function of the critical reagents and their components used in each type of extraction; mechanism and theory of the extraction process; sensitivity, advantages and limitations of DNA extraction methods; quality control methods/procedures for DNA extraction; and contamination issues that may arise during DNA extraction methods.

## **11.6 Documentation:**

- 11.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 11.0 Checklist- DNA Extraction."



## MODULE 11.0 CHECKLIST DNA Extraction

Trainee:	Trainer:	Job Title:
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### READING MATERIAL

	Trainee Initials & Date	Trainer Initials & Date
Trainee has read all the required readings for Module 11.0.		

### STUDY/DISCUSSION QUESTIONS

	Trainee Initials & Date
Trainee has the ability to answer study/discussion questions for Module 11.0.	

### PRACTICAL EXERCISES/SKILLS

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the practical exercises in Module 11.0, noted the results in their training binder, and results were reviewed by the Trainer for accuracy.		

### COMPETENCY TEST

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the competency test for Module 11.0 (passing score of 80% or greater for written exams).		

### ORAL BOARD

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the oral board for Module 11.0.		

Signatures below represent successful completion of Training Module 11.0.

\_\_\_\_\_  
Trainee Date

\_\_\_\_\_  
Trainer Date

\_\_\_\_\_  
FBU Technical Leader Date

## 12.0 DNA Quantitation

### 12.1 Objectives:

- 12.1.1 To develop and demonstrate an understanding of the principles and practices of DNA quantitation.
- 12.1.2 As recommended by the Scientific Working Group on DNA Analysis Methods (SWGDM) Training Guidelines, the Trainee must perform nuclear DNA analysis on a number of samples sufficient to demonstrate the Trainee's competency in the laboratory's analytical procedures. To ensure this guideline is satisfied, the Trainee must perform nuclear DNA analysis on a minimum of 50 samples. Samples will consist of various types and complexities to mimic casework samples routinely analyzed by an analyst.
- 12.1.3 The Trainee should have an understanding of the principles of DNA quantitation, which will include, but is not limited to, the following:
  - 12.1.3.1 The various methods used to perform DNA quantitation, and when to use each technique
  - 12.1.3.2 The sensitivity, specificity and limitations of each quantitation method
  - 12.1.3.3 The mechanism and theory of each quantitation method
  - 12.1.3.4 Correct interpretation of quantitation results and necessary calculations for determination of proper amounts of template DNA for amplification
  - 12.1.3.5 The utility of controls
  - 12.1.3.6 Proper operation and maintenance of equipment
  - 12.1.3.7 QAS requirements for quantitation of forensic samples

### 12.2 Reading Material:

- 12.2.1 Refer to the FBU required readings checklist for reading material ([X:\Training\FBU Required Reading Documents](#))

### 12.3 Study/Discussion Questions:

- 12.3.1 What is quantitation?
- 12.3.2 Describe the quantitation method used by FBU.
- 12.3.3 What are the advantages of the quantitation method used by FBU?
- 12.3.4 What are the limitations of the quantitation method used by FBU?
- 12.3.5 What are other quantitation methods used by the forensic community and how do they differ with the method used by FBU?
- 12.3.6 Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the Trainees understanding of topics covered in this module.

## 12.4 Practical Exercises/Skills:

- 12.4.1 Important Note: DNA extracts should be retained for use in the subsequent modules
- 12.4.2 Observe a qualified individual(s) perform equipment maintenance and calibration on the quantitation instruments. Also observe a qualified individual(s) perform any related quality control procedures (AB 7500 Real-Time PCR System, Quality Control of Plexor HY Kits). On the 30-Day Progress Report (Document Control Number 7496), record the following: equipment maintenance, calibration or quality control procedure(s) observed, qualified individual(s) observed, date of observation.
- 12.4.3 Receive instruction and demonstration by a qualified analyst(s) in DNA quantitation. This may be completed by a series of lectures/presentations and hands-on exercises. Topics that will be covered include, but are not limited to, the following:
  - 12.4.3.1 DNA quantitation methods (mechanism and theory, sensitivity and limitations)
  - 12.4.3.2 Function of DNA quantitation critical reagents and their components
  - 12.4.3.3 Data analysis software
  - 11.4.3.4 DNA quantitation quality assurance/quality control practices
- 12.4.4 Observe a qualified individual(s) perform DNA quantitation (including data analysis, interpretation and calculations) using the methods outlined in the laboratory FBSOPs on at least 3 batches/runs. Observe and review casework note-taking and documentation. On the 30-Day Progress Report (Document Control Number 7496), record the case number/batch number, qualified individual(s) observed, date of observation and number of samples.
- 12.4.5 Demonstrate the techniques to the Trainer, then quantitate (including data analysis, interpretation and calculations) the remaining DNA extracts that were generated during the extraction module using the methods outlined in the laboratory FBSOPs. Training samples may be batched together. Document on the 30-Day Progress Report (Document Control Number 7496). Trainer must observe Trainee perform DNA quantitation (including data analysis, interpretation and calculations) at least once, prior to Trainee proceeding to independent exercises. Each case/batch set should be reviewed and approved by Trainer prior to proceeding to next case/batch set. (*Note: all DNA extracts from the extraction training module will need to be quantitated*). Record results in STACS as appropriate and take notes according to laboratory protocol.
- 12.4.6 Note: Throughout the training program, the Trainee is expected to gather case notes and reports of qualified individuals to use as examples for learning how to take case notes and write reports of their own. Throughout the training program, the Trainee should also use reports for practice on technical and administrative reviews. Reviews and any questions regarding developing case notes, writing reports, and the technical and administrative review process should be discussed with Trainer(s). As Trainees progress through training,

their knowledge and ability to work independently with case notes, report writing and conducting reviews should increase.

## **12.5 Demonstration of Competency:**

- 12.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in Training Binder, and the Trainer has reviewed for accuracy and meeting the objectives of the exercise(s).
- 12.5.2 The Trainee must successfully complete an unsupervised competency test which may be performed in conjunction with other qualifying tests.
- 12.5.3 The Trainee must successfully complete an oral board, addressing in detail the following: the method used to perform DNA quantitation utilized by FBU; the sensitivity, specificity and limitations of the quantitation method; the correct interpretation of quantitation results and necessary calculations for determination of proper amounts of template DNA for amplification; quality control methods/procedures for DNA quantitation utilized by FBU.

## **12.6 Documentation:**

- 12.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 12.0 Checklist- DNA Quantitation."

## MODULE 12.0 CHECKLIST

### DNA Quantitation

Trainee:	Trainer:	Job Title:
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#### READING MATERIAL

	Trainee Initials & Date	Trainer Initials & Date
Trainee has read all the required readings for Module 12.0.		

#### STUDY/DISCUSSION QUESTIONS

	Trainee Initials & Date
Trainee has the ability to answer study/discussion questions for Module 12.0.	

#### PRACTICAL EXERCISES/SKILLS

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the practical exercises in Module 12.0, noted the results in their training binder, and results were reviewed by the Trainer for accuracy.		

#### COMPETENCY TEST

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the competency test for Module 12.0 (passing score of 80% or greater for written exams).		

#### ORAL BOARD

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the oral board for Module 12.0.		

Signatures below represent successful completion of Training Module 12.0.

\_\_\_\_\_  
Trainee Date

\_\_\_\_\_  
Trainer Date

\_\_\_\_\_  
FBU Technical Leader Date

## **13.0 PCR Amplification**

### **13.1 Objectives:**

- 13.1.1 To develop and demonstrate an understanding of the principles and practices of DNA amplification.
- 13.1.2 As recommended by the Scientific Working Group on DNA Analysis Methods (SWGDM) Training Guidelines, the Trainee must perform nuclear DNA analysis on a number of samples sufficient to demonstrate the Trainee's competency in the laboratory's analytical procedures. To ensure this guideline is satisfied, the Trainee must perform nuclear DNA analysis on a minimum of 50 samples. Samples will consist of various types and complexities to mimic casework samples routinely analyzed by an analyst.
- 13.1.3 The Trainee should have an understanding of the principles of Polymerase Chain Reaction (PCR) amplification, which will include, but is not limited to the following:
  - 13.1.3.1 The preparation, handling and function of reagents and their components used for PCR amplification
  - 13.1.3.2 The mechanism and theory of the PCR amplification process and thermal cycling parameters
  - 13.1.3.3 The proper operation and maintenance of the thermal cycler
  - 13.1.3.4 Quality control and logging procedures for amplification kits
  - 13.1.3.5 The different types of amplification kits used in the forensic community and the pros and cons of them
  - 13.1.3.6 Utility of controls

### **13.2 Reading Material:**

- 13.2.1 Refer to the FBU required readings checklist for reading material (<X:\Training\FBU Required Reading Documents>).

### **13.3 Study/Discussion Questions:**

- 13.3.1 What is PCR? Describe the mechanism.
- 13.3.2 What are the key components in PCR and their function?
- 13.3.3 List several common inhibitors present in DNA evidence. How do inhibitors prevent DNA amplification?
- 13.3.4 How does RT-PCR differ from traditional PCR?
- 13.3.5 Define stochastic effects.
- 13.3.6 Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the Trainees understanding of topics covered in this module.

### **13.4 Practical Exercises/Skills:**

- 13.4.1 Important Note: DNA extracts and amplification product should be retained for use in the subsequent modules

- 13.4.2 Observe a qualified individual(s) perform equipment maintenance and calibration on the thermal cyclers and reagent quality control procedures (Quality Control-GlobalFiler PCR Amplification Kits, Quality Control- Thermal Cyclers). On the 30-Day Progress Report (Document Control Number 7496), record the equipment maintenance, calibration or quality control procedure(s) observed, qualified individual(s) observed, date of observation
- 13.4.3 Receive instruction and demonstration by a qualified analyst(s) in PCR amplification. This may be completed by a series of lectures/presentations and hands-on exercises. Topics that will be covered include, but are not limited to, the following:
- 13.4.3.1 Mechanism and theory
  - 13.4.3.2 Function of PCR amplification critical reagents and their components
  - 13.4.3.3 Factors that may affect optimal PCR amplification
  - 13.4.3.4 PCR amplification quality assurance/quality control practices
- 13.4.4 Observe a qualified individual(s) perform PCR amplification using the methods outlined in the laboratory FBSOPs on at least 3 batches/runs. Observe preparation of sample extract dilutions and review casework note-taking and documentation. On the 30-Day Progress Report (Document Control Number 7496), record the case number/batch number, qualified individual(s) observed, date of observation and number of samples.
- 13.4.5 Perform the following experiments, recording results in STACS as appropriate and taking notes according to laboratory protocol, demonstrating the techniques to the Trainer. Training samples may be batched together. Document on the 30-Day Progress Report (Document Control Number 7496). Trainer must observe Trainee perform PCR amplification at least once, prior to Trainee proceeding to independent exercises. Each case/batch set should be reviewed and approved by Trainer prior to proceeding to next case/batch set.
- 13.4.6 Prepare a reference DNA extract at the following targets: 4ng, 2ng, 1ng, 0.5ng, 0.25ng, 0.125ng. Use a dilution series or prepare each individually ensuring that an appropriate volume is prepared for each to be amplified. Each dilution may be quantitated to verify that the concentration is correct. Amplify each sample using the methods outlined in the laboratory FBSOPs.
- 13.4.7 Amplify the DNA extracts that were generated during the extraction module (as applicable) using the methods outlined in the laboratory FBSOPs.
- 13.4.8 Note: Throughout the training program, the Trainee is expected to gather case notes and reports of qualified individual(s) to use as examples for learning how to take case notes and write reports of their own. Throughout the training program, the Trainee should also use reports for practice on technical and administrative reviews. Reviews and any questions regarding developing case notes, writing reports, and the technical and administrative review process should be discussed with Trainer(s). As Trainees progress through training, their knowledge and ability to work independently with case notes, report writing and conducting reviews should increase.

### **13.5 Demonstration of Competency:**

- 13.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in Training Binder, and the Trainer has reviewed for accuracy and meeting the objectives of the exercise(s).
- 13.5.2 The Trainee must successfully complete an unsupervised competency test which may be performed in conjunction with other qualifying tests.
- 13.5.3 The Trainee must successfully complete an oral board addressing in detail the following: The principles of Polymerase Chain Reaction (PCR) amplification to include preparation, handling and function of reagents and their components; mechanism and theory of the PCR amplification process and thermal cycling parameters; different types of amplification kits used in the forensic community and the pros and cons of each; quality control methods/procedures for PCR amplification utilized by FBU.

### **13.6 Documentation:**

- 13.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 13.0 Checklist- PCR Amplification."



## MODULE 13.0 CHECKLIST PCR Amplification

Trainee:	Trainer:	Job Title:
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### READING MATERIAL

	Trainee Initials & Date	Trainer Initials & Date
Trainee has read all the required readings for Module 13.0.		

### STUDY/DISCUSSION QUESTIONS

	Trainee Initials & Date
Trainee has the ability to answer study/discussion questions for Module 13.0.	

### PRACTICAL EXERCISES/SKILLS

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the practical exercises in Module 13.0, noted the results in their training binder, and results were reviewed by the Trainer for accuracy.		

### COMPETENCY TEST

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the competency test for Module 13.0 (passing score of 80% or greater for written exams).		

### ORAL BOARD

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the oral board for Module 13.0.		

Signatures below represent successful completion of Training Module 13.0.

\_\_\_\_\_  
Trainee Date

\_\_\_\_\_  
Trainer Date

\_\_\_\_\_  
FBU Technical Leader Date

## 14.0 Capillary Electrophoresis

### 14.1 Objectives:

- 14.1.1 To develop and demonstrate an understanding of the principles and practices of capillary electrophoresis.
- 14.1.2 As recommended by the Scientific Working Group on DNA Analysis Methods (SWGDM) Training Guidelines, the Trainee must perform nuclear DNA analysis on a number of samples sufficient to demonstrate the Trainee's competency in the laboratory's analytical procedures. To ensure this guideline is satisfied, the Trainee must perform nuclear DNA analysis on a minimum of 50 samples. Samples will consist of various types and complexities to mimic casework samples routinely analyzed by an analyst.
- 14.1.3 The Trainee should have an understanding of the principles of capillary electrophoresis and data analysis and interpretation, which will include, but is not limited to, the following:
  - 14.1.3.1 The various techniques used to perform capillary electrophoresis (including the set-up and maintenance of the instrument)
  - 14.1.3.2 The mechanism and theory of capillary electrophoresis
  - 14.1.3.3 The specificity and sensitivity of capillary electrophoresis
  - 14.1.3.4 Spectral and spatial calibrations
  - 14.1.3.5 The recognition of PCR and electrophoresis artifacts and genetic abnormalities
  - 14.1.3.6 The preparation, handling and function of reagents used in capillary electrophoresis
  - 14.1.3.7 Troubleshooting techniques used in capillary electrophoresis (e.g., instrumentation)
  - 14.1.3.8 The utility of controls and standards

### 14.2 Reading Material:

- 14.2.1 Refer to the FBU required readings checklist for reading material (<X:\Training\FBU Required Reading Documents>).

### 14.3 Study/Discussion Questions:

- 14.3.1 Describe the process of capillary electrophoresis.
- 14.3.2 List the main components of the capillary electrophoresis instrument and their function.
- 14.3.3 What is the difference between spectral resolution and spatial resolution?
- 14.3.4 What is the purpose of an allelic ladder and internal lane standard?
- 14.3.5 How do changes in room temperature affect capillary electrophoresis?
- 14.3.6 Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the Trainees understanding of topics covered in this module.

### 14.4 Practical Exercises/Skills:

- 14.4.1 Important Note: DNA extracts and amplification products should be retained.
- 14.4.2 Observe a qualified individual(s) perform reagent preparation, equipment maintenance, calibration and quality control procedures (Hi-Di Formamide, Maintenance of the AB 3500/3500xl Genetic Analyzer). On the 30-Day Progress Report (Document Control Number 7496), record the equipment maintenance, calibration or quality control procedure(s) observed, qualified individual(s) observed, date of observation.
- 14.4.3 Receive instruction and demonstration by a qualified analyst(s) in capillary electrophoresis. This may be completed by a series of lectures/presentations and hands-on exercises. Topics that will be covered include, but are not limited to, the following:
  - 14.4.3.1 Instrumentation (i.e., maintenance, performance, calibrations and troubleshooting)
  - 14.4.3.2 Mechanism and theory
  - 14.4.3.3 Data collection software
  - 14.4.3.4 Capillary electrophoresis quality assurance/quality control practices
- 14.4.4 Observe a qualified individual(s) clean and set up the Genetic Analyzer, prepare and run amplified samples using the methods outlined in the laboratory FBSOPs on at least 3 batches/runs. Take notes regarding each of the procedures and review casework note-taking and documentation. On the 30-Day Progress Report (Document Control Number 7496), record the following: case number/batch number, qualified individual(s) observed, date of observation and number of samples.
- 14.4.5 Perform the following experiments, recording results in STACS as appropriate and taking notes according to laboratory protocol, demonstrating the techniques to the Trainer. Training samples may be batched together. Document on the 30-Day Progress Report (Document Control Number 7496). Trainer must observe Trainee perform capillary electrophoresis at least once, prior to Trainee proceeding to independent exercises. Each case/batch set should be reviewed and approved by Trainer prior to proceeding to next case/batch set.
- 14.4.6 Perform maintenance on the Genetic Analyzer according to laboratory protocol.
- 14.4.7 Prepare and run amplified samples generated during the PCR amplification module using the methods outlined in the laboratory FBSOPs.
- 14.4.8 Note: Throughout the training program, the Trainee is expected to gather case notes and reports of qualified individuals to use as examples for learning how to take case notes and write reports of their own. Throughout the training program, the Trainee should also use reports for practice on technical and administrative reviews. Reviews and any questions regarding developing case notes, writing reports, and the technical and administrative review process should be discussed with Trainer(s). As Trainees progress through training, their knowledge and

ability to work independently with case notes, report writing and conducting reviews should increase.

#### **14.5 Demonstration of Competency:**

- 14.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in Training Binder, and the Trainer has reviewed for accuracy and meeting the objectives of the exercise(s).
- 14.5.2 The Trainee must successfully complete an unsupervised competency test which may be performed in conjunction with other qualifying tests.
- 14.5.3 The Trainee must successfully complete an oral board addressing in detail the following: The mechanism and theory of capillary electrophoresis; various techniques used to perform capillary electrophoresis (including the set-up and maintenance of the instrument and reagents used in capillary electrophoresis); the specificity and sensitivity of capillary electrophoresis; quality control methods/procedures for capillary electrophoresis utilized by FBU.

#### **14.6 Documentation:**

- 14.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 14.0 Checklist- Capillary Electrophoresis."

## MODULE 14.0 CHECKLIST

### Capillary Electrophoresis

Trainee:	Trainer:	Job Title:
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#### READING MATERIAL

	Trainee Initials & Date	Trainer Initials & Date
Trainee has read all the required readings for Module 14.0.		

#### STUDY/DISCUSSION QUESTIONS

	Trainee Initials & Date
Trainee has the ability to answer study/discussion questions for Module 14.0.	

#### PRACTICAL EXERCISES/SKILLS

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the practical exercises in Module 14.0, noted the results in their training binder, and results were reviewed by the Trainer for accuracy.		

#### COMPETENCY TEST

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the competency test for Module 14.0 (passing score of 80% or greater for written exams).		

#### ORAL BOARD

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the oral board for Module 14.0.		

Signatures below represent successful completion of Training Module 14.0.

\_\_\_\_\_  
Trainee Date

\_\_\_\_\_  
Trainer Date

\_\_\_\_\_  
FBU Technical Leader Date

## **15.0 STR/CE Data Analysis**

### **15.1 Objectives:**

- 15.1.1 To develop and demonstrate an understanding of the principles and practices of Short Tandem Repeat (STR)/Capillary Electrophoresis (CE) Data Analysis.
- 15.1.2 As recommended by the Scientific Working Group on DNA Analysis Methods (SWGDM) Training Guidelines, the Trainee must perform nuclear DNA analysis on a number of samples sufficient to demonstrate the Trainee's competency in the laboratory's analytical procedures. To ensure this guideline is satisfied, the Trainee must perform nuclear DNA analysis on a minimum of 50 samples. Samples will consist of various types and complexities to mimic casework samples routinely analyzed by an analyst.
- 15.1.3 The Trainee should have an understanding of the principles of STR/CE Data Analysis, which will include, but is not limited to, the following:
  - 15.1.3.1 Operation of relevant CE data analysis software
  - 15.1.3.2 Creation, application and evaluation of parameters to include:
    - 15.1.3.2.1 Spatial and spectral calibrations
    - 15.1.3.2.2 Analysis parameters
    - 15.1.3.2.3 Sizing standard (defining)
    - 15.1.3.2.4 Analytical Threshold
  - 15.1.3.3 Software Algorithms
  - 15.1.3.4 Evaluation of CE Data
    - 15.1.3.4.1 Ability to recognize acceptable and unacceptable data per laboratory protocol
    - 15.1.3.4.2 Identification and troubleshooting of artifacts and anomalies (i.e., spikes, dye blobs, spectral pull up, microvariants, stutter, -A)
  - 15.1.3.5 Troubleshooting capillary electrophoresis data (i.e., spikes, pull-up, spectral problems)

### **15.2 Reading Material:**

- 15.2.1 Refer to the FBU required readings checklist for reading material ([X:\Training\FBU Required Reading Documents](#)).

### **15.3 Study/Discussion Questions:**

- 15.3.1 What is the main function of CE genotyping software?
- 15.3.2 What is an electropherogram?
- 15.3.3 List the main technology-related and biology-related artifacts that may appear on electropherograms and what cause them.
- 15.3.4 What is an analytical threshold for CE data? How was the threshold determined in FBU?
- 15.3.5 Describe how a mixture profile, single source profile, degraded DNA profile, low template DNA profile and inhibited DNA profile electropherogram differ in appearance.

- 15.3.6 Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the Trainees understanding of topics covered in this module.

#### **15.4 Practical Exercises/Skills:**

- 15.4.1 Receive instruction and demonstration by a qualified analyst(s) of CE data analysis software. This may be completed by a series of lectures/presentations and hands-on exercises which may include practice data. Topics that will be covered include, but are not limited to, the following:
- 15.4.1.1 Operation of CE data analysis software
  - 15.4.1.2 Analysis parameters, spatial and spectral calibrations, sizing standard
  - 15.4.1.3 Software algorithms
  - 15.4.1.4 Identification and troubleshooting of artifacts and anomalies (i.e., spikes, dye blobs, spectral pull-up, microvariants, stutter, -A)
  - 15.4.1.5 Data evaluation (i.e., raw and analyzed data, acceptable and unacceptable data, controls, heterozygote/homozygote peak evaluation, minimum thresholds)
- 15.4.2 Observe qualified individual(s) perform CE data analysis using software according to laboratory protocol on at least 3 batches. Take notes regarding each of the procedures and review casework note-taking and documentation. On the 30-Day Progress Report (Document Control Number 7496), record the case number/batch number, qualified individual(s) observed, date of observation and number of samples.
- 15.4.3 Perform the following experiments, recording results in STACS as appropriate and taking notes according to laboratory protocol, demonstrating the techniques to the Trainer. Training samples may be batched together. Document on the 30-Day Progress Report (Document Control Number 7496). Trainer must observe Trainee perform capillary electrophoresis at least once, prior to Trainee proceeding to independent exercises. Each case/batch set should be reviewed and approved by Trainer prior to proceeding to next case/batch set.
- 15.4.4 Perform CE data analysis on all DNA samples processed from previous modules. Evaluate data according to laboratory protocol. Complete a "STR Data Analysis Training Worksheet" (Document Control Number 3921) for each sample and submit for review to Trainer. Troubleshoot applicable samples and perform additional work, if needed, according to laboratory protocol.
- 15.4.5 Evaluate and discuss reference dilution series results with Trainer.
- 15.4.6 Note: Throughout the training program, the Trainee is expected to gather case notes and reports of qualified individuals to use as examples for learning how to take case notes and write reports of their own. Throughout the training program, the Trainee should also use reports for practice on technical and administrative reviews. Reviews and any questions regarding developing case notes, writing reports, and the technical and administrative review process should be discussed with Trainer(s). As Trainees progress through training, their knowledge and

ability to work independently with case notes, report writing and conducting reviews should increase.

**15.5 Demonstration of Competency:**

15.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in Training Binder, and the Trainer has reviewed for accuracy and meeting the objectives of the exercise(s).

15.5.2 The Trainee must successfully complete an unsupervised competency test which may be performed in conjunction with other qualifying tests.

15.5.3 Analysts, see Module 17 for oral board requirements.

**15.6 Documentation:**

15.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 15.0 Checklist- STR/CE Data Analysis."



## MODULE 15.0 CHECKLIST STR/CE Data Analysis

Trainee:	Trainer:	Job Title:
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### READING MATERIAL

	Trainee Initials & Date	Trainer Initials & Date
Trainee has read all the required readings for Module 15.0.		

### STUDY/DISCUSSION QUESTIONS

	Trainee Initials & Date
Trainee has the ability to answer study/discussion questions for Module 15.0.	

### PRACTICAL EXERCISES/SKILLS

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the practical exercises in Module 15.0, noted the results in their training binder, and results were reviewed by the Trainer for accuracy.		

### COMPETENCY TEST

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the competency test for Module 15.0 (passing score of 80% or greater for written exams).		

### ORAL BOARD

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the oral board for Module 15.0.		

Signatures below represent successful completion of Training Module 15.0.

\_\_\_\_\_  
Trainee Date

\_\_\_\_\_  
Trainer Date

\_\_\_\_\_  
FBU Technical Leader Date

## 16.0 DNA Interpretation

### 16.1 Objectives:

- 16.1.1 To develop and demonstrate an understanding of the principles and practices of Short Tandem Repeat (STR) DNA Interpretation.
- 16.1.2 As recommended by the Scientific Working Group on DNA Analysis Methods (SWGDM) Training Guidelines, the Trainee must perform nuclear DNA analysis on a number of samples sufficient to demonstrate the Trainee's competency in the laboratory's analytical procedures. To ensure this guideline is satisfied, the Trainee must perform nuclear DNA analysis on a minimum of 50 samples. Samples will consist of various types and complexities to mimic casework samples routinely analyzed by an analyst. In addition, the Forensic Biology Analyst Trainee will review 20 sets of data representative of casework and perform interpretation of the data according to the laboratory policy.
- 16.1.3 The Trainee should have an understanding of the principles of STR DNA Interpretation, which will include, but is not limited to, the following:
  - 16.1.3.1 SWGDAM Interpretation Guidelines
  - 16.1.3.2 Evaluation of data
  - 16.1.3.3 Allele designation
  - 16.1.3.4 Peak height ratio / Heterozygote balance
  - 16.1.3.5 Assigning number of contributors and making assumptions
  - 16.1.3.6 Single source and mixture interpretation approaches
    - 16.1.3.6.1 Binary approach
    - 16.1.3.6.2 Continuous approach
  - 16.1.3.7 Mixture deconvolution
    - 16.1.3.7.1 Allele sharing
    - 16.1.3.7.2 Contributor proportions
    - 16.1.3.7.3 Mixtures with: Major/Minor Contributor(s), Known Contributor(s), Indistinguishable Contributor(s)
  - 16.1.3.8 Comparison to Known Reference(s)
    - 16.1.3.8.1 Inclusion/ Exclusion/ Inconclusive Conclusion
  - 16.1.3.9 Probabilistic Genotyping Software
    - 16.1.3.9.1 Continuous model
    - 16.1.3.9.2 Biological model
    - 16.1.3.9.3 DNA Profile building (Expected vs Observed; Weights)
    - 16.1.3.9.4 MCMC (Markov Chain Monte Carlo)
    - 16.1.3.9.5 Parameters
    - 16.1.3.9.6 Output and Diagnostics
    - 16.1.3.9.7 Validation
    - 16.1.3.9.8 Troubleshooting
  - 16.1.3.10 Interpretation challenges
    - 16.1.3.10.1 Stochastic Effects (i.e., definition, occurrence, and how does it affect DNA interpretation)
    - 16.1.3.10.2 Low Template DNA
    - 16.1.3.10.3 Complex Mixtures

### 16.2 Reading Material:

- 16.2.1 Refer to the FBU required readings checklist for reading material ([X:\Training\FBU Required Reading Documents](#)).

### **16.3 Study/Discussion Questions:**

- 16.3.1 Discuss what some of the SWGDAM STR Interpretation Guidelines.  
16.3.2 What is mixture deconvolution and what are the primary steps?  
16.3.3 What is STRmix™ and how is it used by FBU?  
16.3.4 Describe Markov Chain Monte Carlo (MCMC) using the Metropolis-Hastings algorithm.  
16.3.5 Define inclusion, exclusion, and inconclusive comparison results.  
16.3.6 Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the Trainees understanding of topics covered in this module.

### **16.4 Practical Exercises/Skills:**

- 16.4.1 Receive instruction and demonstration by a qualified analyst(s) in interpretation of STR DNA typing results. This may be completed by a series of lectures/presentations and hands-on exercises which may include practice data. Topics that will be covered include, but are not limited to, the following:
- 16.4.1.1 Data Interpretation Overview based on SWGDAM STR Interpretation Guidelines
  - 16.4.1.2 Evaluation of data
  - 16.4.1.3 Assigning number of contributors and making assumptions
  - 16.4.1.4 Single source and mixture interpretation approaches
  - 16.4.1.5 Mixture deconvolution
  - 16.4.1.6 Comparison to Known Reference(s)
  - 16.4.1.7 Probabilistic Genotyping Software
  - 16.4.1.8 Interpretation challenges
- 16.4.2 Observe qualified analyst(s) perform interpretation of STR DNA typing results according to laboratory protocol on 5 - 10 cases, covering a range of sample complexity (single source to 5-person mixtures). Take notes regarding each of the procedures. On the 30-Day Progress Report (Document Control Number 7496), record the case number, qualified analyst(s) observed, and date of observation.
- 16.4.3 Perform mixture deconvolution on a two-person mixture sample using the binary method and using probabilistic genotyping software. Compare and contrast both methods and submit for review to Trainer.
- 16.4.4 Complete the STRmix™ Advanced Report troubleshooting exercise. Determine the issue with each practice set and what the resolution to the issue would be.

- 16.4.5 Perform presentation(s) on STRmix™; topics should include, but are not limited to: what is probabilistic genotyping, what is STRmix™, how does it work, limitations, validation, use in FBU.
- 16.4.6 Interpret results on data from the 15-20 cases/sample sets (e.g. varying number of contributors [1 – 5 contributors] and low level samples) representative of typical casework or actual casework data, and the training case samples (where applicable) from previous modules, using STRmix™ as applicable. Complete “STR Interpretation Training Worksheet” (Document Control Number 3943) for each sample and submit for review to Trainer.
- 16.4.7 Note: Throughout the training program, the Trainee is expected to gather case notes and reports of analysts to use as examples for learning how to take case notes and write reports of their own. Throughout the training program, the Trainee should also use reports for practice on technical and administrative reviews. Reviews and any questions regarding developing case notes, writing reports, and the technical and administrative review process should be discussed with Trainer(s). As Trainees progress through training, their knowledge and ability to work independently with case notes, report writing and conducting reviews should increase.

#### **16.5 Demonstration of Competency:**

- 16.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in Training Binder, and the Trainer has reviewed for accuracy and meeting the objectives of the exercise(s).
- 16.5.2 The Trainee must successfully complete an unsupervised competency test, which may be performed in conjunction with other qualifying tests.
- 16.5.3 See Module 17 for oral board requirements.

#### **16.6 Documentation:**

- 16.6.1 Completion of the tasks in this module will be documented on the checklist titled “Module 16.0 Checklist- DNA Interpretation.”

## MODULE 16.0 CHECKLIST DNA Interpretation

Trainee:	Trainer:	Job Title:
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### READING MATERIAL

	Trainee Initials & Date	Trainer Initials & Date
Trainee has read all the required readings for Module 16.0.		

### STUDY/DISCUSSION QUESTIONS

	Trainee Initials & Date
Trainee has the ability to answer study/discussion questions for Module 16.0.	

### PRACTICAL EXERCISES/SKILLS

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the practical exercises in Module 16.0, noted the results in their training binder, and results were reviewed by the Trainer for accuracy.		

### COMPETENCY TEST

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the competency test for Module 16.0 (passing score of 80% or greater for written exams).		

Signatures below represent successful completion of Training Module 16.0.

\_\_\_\_\_  
Trainee Date

\_\_\_\_\_  
Trainer Date

\_\_\_\_\_  
FBU Technical Leader Date

## **17.0 Statistics**

### **17.1 Objectives:**

- 17.1.1 To develop and demonstrate an understanding of the principles and practices of the various statistical calculations that can be applied to forensic DNA analysis.
- 17.1.2 As recommended by the Scientific Working Group on DNA Analysis Methods (SWGDM) Training Guidelines, the Trainee must perform nuclear DNA analysis on a number of samples sufficient to demonstrate the Trainee's competency in the laboratory's analytical procedures. To ensure this guideline is satisfied, the Trainee must perform nuclear DNA analysis on a minimum of 50 samples. Samples will consist of various types and complexities to mimic casework samples routinely analyzed by an analyst. In addition, the Forensic Biology Analyst Trainee will review 20 sets of data representative of casework and perform interpretation of the data according to the laboratory policy.
- 17.1.3 The Trainee should have an understanding of how to properly calculate and apply statistics to DNA typing results. The Trainee should have an understanding of the principles of statistical analysis of DNA typing results, which will include, but is not limited to, the following:
  - 17.1.3.1 Population Genetics
  - 17.1.3.2 Population Databases
  - 17.1.3.3 Laws of Probability
  - 17.1.3.4 Statistical approaches
    - 17.1.3.4.1 Likelihood Ratios (LR)
    - 17.1.3.4.2 Random Match Probability (RMP)
    - 17.1.3.4.3 Combined Probability of Inclusion/Exclusion (CPI/CPE)
    - 17.1.3.4.4 Limitations
    - 17.1.3.4.5 Advantages/Disadvantages
  - 17.1.3.5 Likelihood Ratios
    - 17.1.3.5.1 Bayes Theorem
    - 17.1.3.5.2 Formulating Propositions
    - 17.1.3.5.3 Logical Fallacies
    - 17.1.3.5.4 Use in probabilistic modeling

### **17.2 Reading Material:**

- 17.2.1 Refer to the FBU required reading checklist for reading material ([X:\Training\FBU Required Reading Documents](#)).

### **17.3 Study/Discussion Questions:**

- 17.3.1 Define the three laws of probability.
- 17.3.2 When and why are statistics performed in DNA analysis?
- 17.3.3 Compare and contrast RMP, CPI/CPE and LR statistical methods.
- 17.3.4 What are the limitations of each statistical method?
- 17.3.5 Why is likelihood ratio the preferred statistical method to be used by DC DFS?

- 17.3.6 Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the Trainees understanding of topics covered in this module.

#### **17.4 Practical Exercises/Skills:**

- 17.4.1 Receive instruction and demonstration by a qualified analyst(s) in statistical analysis of DNA typing results. This may be completed by a series of lectures/presentations and hands-on exercises which may include practice data. Topics that will be covered include, but are not limited to, the following:
- 17.4.1.1 Likelihood Ratios (LR)
  - 17.4.1.2 Random Match Probability (RMP)
  - 17.4.1.3 Combined Probability of Inclusion/Exclusion (CPI/CPE)
- 17.4.2 Observe qualified analyst(s) perform statistical analysis using STRmix™ software and the methods outlined in the laboratory FBSOPs on a minimum of 5 - 10 cases, covering a range of sample complexity (single source to 5 person mixtures). Take notes regarding each of the procedures and review casework note-taking and documentation. On the 30-Day Progress Report (Document Control Number 7496), record the case number, qualified analyst(s) observed, and date of observation.
- 17.4.3 Perform statistical analysis using STRmix™ software on data from the 15-20 cases/sample sets (i.e., varying number of contributors [1 – 5 contributors] and low level samples) representative of typical casework or actual casework data, and the training case samples (where applicable) from previous modules.
- 17.4.4 Note: Throughout the training program, the Trainee is expected to gather case notes and reports of analysts to use as examples for learning how to take case notes and write reports of their own. Throughout the training program, the Trainee should also use reports for practice on technical and administrative reviews. Reviews and any questions regarding developing case notes, writing reports, and the technical and administrative review process should be discussed with Trainer(s). As Trainees progress through training, their knowledge and ability to work independently with case notes, report writing and conducting reviews should increase.

#### **17.5 Demonstration of Competency:**

- 17.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in Training Binder, and the Trainer has reviewed for accuracy and meeting the objectives of the exercise(s).
- 17.5.2 The Trainee must successfully complete an unsupervised competency test, which may be performed in conjunction with other qualifying tests.
- 17.5.3 The Trainee must successfully complete an oral board addressing in detail the following: STR data analysis, (including analysis parameters and evaluation of data); STR DNA interpretation (including STRmix™); population genetics and the

use of population databases; the statistical calculations and applications used in STR DNA analysis.

**17.6 Documentation:**

17.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 17.0 Checklist- Statistics."



## MODULE 17.0 CHECKLIST

### Statistics

Trainee:	Trainer:	Job Title:
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#### READING MATERIAL

	Trainee Initials & Date	Trainer Initials & Date
Trainee has read all the required readings for Module 17.0.		

#### STUDY/DISCUSSION QUESTIONS

	Trainee Initials & Date
Trainee has the ability to answer study/discussion questions for Module 17.0.	

#### PRACTICAL EXERCISES/SKILLS

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the practical exercises in Module 17.0, noted the results in their training binder, and results were reviewed by the Trainer for accuracy.		

#### COMPETENCY TEST

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the competency test for Module 17.0 (passing score of 80% or greater for written exams).		

#### ORAL BOARD

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the oral board for Module 17.0.		

Signatures below represent successful completion of Training Module 17.0.

\_\_\_\_\_  
Trainee Date

\_\_\_\_\_  
Trainer Date

\_\_\_\_\_  
FBU Technical Leader Date

## **18.0 CODIS**

### **18.1 Objectives:**

- 18.1.1 To develop an understanding and demonstrate competency in the use of the CODIS system in the District of Columbia in accordance with the current version of the DFS CODIS Procedures Manual and NDIS related procedures.
- 18.1.2 The Trainee should have an understanding of the policies and procedures pertaining to CODIS which should include, but is not limited to, the following:
  - 18.1.2.1 CODIS structure (i.e., Local, State, National)
  - 18.1.2.2 CODIS indices (i.e., Forensic, Convicted Offender, Missing Persons)
  - 18.1.2.3 Suitability of profiles for CODIS entry

### **18.2 Reading Material:**

- 18.2.1 Refer to the FBU required reading checklist for reading material ([X:\Training\FBU Required Reading Documents](#)).

### **18.3 Study/Discussion Questions:**

- 18.3.1 What is CODIS?
- 18.3.2 What are the three levels in CODIS? What level is the DFS FBU?
- 18.3.3 What are the loci requirements for CODIS entry and upload at the SDIS level and the NDIS level?
- 18.3.4 What are the requirements for a mixture profile to be entered and uploaded into CODIS?
- 18.3.5 What is the difference between a forensic hit and an offender/arrestee hit?
- 18.3.6 Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the Trainees understanding of topics covered in this module.

### **18.4 Practical Exercises/Skills:**

- 18.4.1 CODIS training session(s) with the laboratory CODIS Administrator/Alternate Administrator. Discussion and instruction on the policies and procedures for CODIS will include but not limited to:
  - 18.4.1.1 National DNA Index System (NDIS) Operating Procedures and Policies
  - 18.4.1.2 CODIS entry eligibility requirements
  - 18.4.1.3 Profile upload and verification
  - 18.4.1.4 FBU Database Entry Form documentation
- 18.4.2 Complete the CODIS software (current version) computer-based training (CBT) modules (when applicable), designated by the CODIS Administrator /Alternate CODIS Administrator.
- 18.4.3 To demonstrate an understanding in profile entry and review of profile entry, the Trainee will be required to complete a "FBU Database Entry Form" (Document

Control Number 3880) for each of the 15-20 cases/sample sets representative of typical casework or actual casework data.

**18.5 Demonstration of Competency:**

- 18.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in Training Binder, and the Trainer has reviewed for accuracy and meeting the objectives of the exercise(s).
- 18.5.2 Trainee must successfully complete the FBI issued “Annual Review of DNA Data Accepted at NDIS” test, required by the NDIS Operational Procedures for all laboratory analysts generating DNA profiles for CODIS entry. The initial test will be taken upon acceptance of the new CODIS user account by the FBI.
- 18.5.3 Trainee must pass the CODIS written quiz ( $\geq 80\%$ ).
- 18.5.4 The Trainee must successfully complete an unsupervised competency test, which may be performed in conjunction with other qualifying tests.

**18.6 Documentation:**

- 18.6.1 Completion of the tasks in this module will be documented on the checklist titled “Module 18.0 Checklist- CODIS.”

## MODULE 18.0 CHECKLIST CODIS

Trainee:	Trainer:	Job Title:
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### READING MATERIAL

	Trainee Initials & Date	CODIS Admin Initials & Date
Trainee has read all the required readings for Module 18.0.		

### STUDY/DISCUSSION QUESTIONS

	Trainee Initials & Date
Trainee has the ability to answer study/discussion questions for Module 18.0.	

### PRACTICAL EXERCISES/SKILLS

	Trainee Initials & Date	CODIS Admin Initials & Date
Trainee has successfully completed the practical exercises in Module 18.0, noted the results in their training binder, and results were reviewed by the Trainer for accuracy.		

### CODIS EXAMS

	Trainee Initials & Date	CODIS Admin Initials & Date
Trainee has successfully completed the CODIS written quiz ( $\geq 80\%$ ).		
Trainee has successfully passed the Annual Review of DNA Data Accepted at NDIS test		

### COMPETENCY TEST

	Trainee Initials & Date	CODIS Admin Initials & Date
Trainee has successfully completed the competency test for Module 18.0 (passing score of 80% or greater for written exams).		

Signatures below represent successful completion of Training Module 18.0.

\_\_\_\_\_  
Trainee Date

\_\_\_\_\_  
Trainer Date

\_\_\_\_\_  
FBU Technical Leader Date

## **19.0 Report Writing**

### **19.1 Objectives:**

- 19.1.1 To develop an understanding and demonstrate competency in preparing forensic case reports in accordance with laboratory Standard Operating Procedures.
- 19.1.2 As recommended by the Scientific Working Group on DNA Analysis Methods (SWGDM) Training Guidelines, the Trainee must perform nuclear DNA analysis on a number of samples sufficient to demonstrate the Trainee's competency in the laboratory's analytical procedures. To ensure this guideline is satisfied, the Forensic Biology Analyst Trainee will review 20 sets of data representative of casework and perform interpretation of the data according to the laboratory policy.
- 19.1.3 The Trainee should have an understanding of how to properly prepare and compose forensic case reports, which should include, but is not limited to, the following:
  - 19.1.3.1 Report format
  - 19.1.3.2 Report wording guidelines
  - 19.1.3.3 QAS requirements for laboratory reports

### **19.2 Reading Material:**

- 19.2.1 Refer to the FBU required reading checklist for reading material (<X:\Training\FBU Required Reading Documents>).

### **19.3 Study/Discussion Questions:**

- 19.3.1 What type of reports are issued by the FBU?
- 19.3.2 What sections are contained in FBU reports?
- 19.3.3 How are supplemental reports documented?

### **19.4 Practical Exercises/Skills:**

- 19.4.1 Receive instruction and demonstration by a qualified analyst(s) in report writing. This may be completed by a series of lectures/presentations and hands-on exercises which may include practice data. Topics that will be covered include, but are not limited to, the following:
  - 19.4.1.1 Report format
  - 19.4.1.2 Report wording guidelines
- 19.4.2 Obtain and review copies of various types of reports to refer to as necessary. Types of reports of cases should include: Serology only (if available), DNA and Serology with/without statistics, DNA only with/without statistics, Discontinuation of Analysis, CODIS Notification.

- 19.4.3 Observe qualified analysts write reports for 5-10 cases, covering a range of complexity (Serology only, DNA with/without statistics, Discontinuation of Analysis, CODIS Notification). On the 30-Day Progress Report (Document Control Number 7496), record the case number, qualified analyst(s) observed, and date of observation.
- 19.4.4 Write a report for each of the 20 cases/sample sets representative of typical casework or actual casework data, and the training case samples (where applicable) from previous modules in accordance with laboratory SOPs.
- 19.4.5 Note: Throughout the training program, the Trainee is expected to gather case notes and reports of analysts to use as examples for learning how to take case notes and write reports of their own. Throughout the training program, the Trainee should also use reports for practice on technical and administrative reviews. Reviews and any questions regarding developing case notes, writing reports, and the technical and administrative review process should be discussed with Trainer(s). As Trainees progress through training, their knowledge and ability to work independently with case notes, report writing and conducting reviews should increase.
- 19.4.6 Note: Study/discussion questions may be incorporated into mini oral quiz sessions or a written exam to evaluate the Trainees understanding of topics covered in this module.

## **19.5 Demonstration of Competency:**

- 19.5.1 Practical Exercises are successfully completed, results in the form of notes and/or photographs (where applicable) are included in Training Binder, and the Trainer has reviewed for accuracy and meeting the objectives of the exercise(s).
- 19.5.2 The Trainee must successfully complete an unsupervised competency test which may be performed in conjunction with other qualifying tests.

## **19.6 Documentation:**

- 19.6.1 Completion of the tasks in this module will be documented on the checklist titled "Module 19.0 Checklist- Report Writing."

## MODULE 19.0 CHECKLIST Report Writing

Trainee:	Trainer:	Job Title:
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### READING MATERIAL

	Trainee Initials & Date	Trainer Initials & Date
Trainee has read all the required readings for Module 19.0.		

### STUDY/DISCUSSION QUESTIONS

	Trainee Initials & Date
Trainee has the ability to answer study/discussion questions for Module 19.0.	

### PRACTICAL EXERCISES/SKILLS

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the practical exercises in Module 19.0, noted the results in their training binder, and results were reviewed by the Trainer for accuracy.		

### COMPETENCY TEST

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the competency test for Module 19.0 (passing score of 80% or greater for written exams).		

Signatures below represent successful completion of Training Module 19.0.

\_\_\_\_\_  
Trainee Date

\_\_\_\_\_  
Trainer Date

\_\_\_\_\_  
FBU Technical Leader Date

## **20.0 Legal Overview/Expert Testimony/Mock Trial**

### **20.1 Objectives:**

- 20.1.1 To gain familiarity with courtroom etiquette and to gain experience in presenting scientific results in accurate but non-technical terms in a court of law.
- 20.1.2 The Trainee should have an understanding of the principles of courtroom etiquette and presentation of evidence, which may include but are not limited to the following:
  - 20.1.2.1 Courtroom demeanor and attire
  - 20.1.2.2 Courtroom procedures and rules
  - 20.1.2.3 Rules of evidence packaging and handling in the courtroom setting
  - 20.1.2.4 Analyst/Technician qualifications
  - 20.1.2.5 Technical testimony
  - 20.1.2.6 Discovery issues
  - 20.1.2.7 General guidelines and Frye and Daubert hearing procedures
  - 20.1.2.8 Ethical responsibilities of the expert witness
  - 20.1.2.9 Appropriate public speaking etiquette
  - 20.1.2.10 Significance of accreditation

### **20.2 Reading Material:**

- 20.2.1 Refer to the FBU required reading checklist for reading material ([X:\Training\FBU Required Reading Documents](#)).

### **20.3 Study/Discussion Questions:**

- 20.3.1 None

### **20.4 Practical Exercises/Skills:**

- 20.4.1 Observe multiple qualified analysts/technicians (as available) testify in court and take notes as to courtroom attire, courtroom procedure (i.e., swearing in, direct, cross, and re-direct and/or re-cross questioning), evidence handling (if applicable), qualifying questions, technical testimony, and any other pertinent observations. On the 30-Day Progress Report (Document Control Number 7496), record the following: case number, qualified analyst(s)/technician(s) observed, date of observation. Prior to testimony observation, perform the following tasks:
  - 20.4.1.1 Review theoretical and practical aspects of the techniques performed during evidence testing for the particular case at hand.
  - 20.4.1.2 Discuss with qualified analysts/technicians some potential questions to be asked during qualifications, direct examination, and cross examination.



- 20.4.1.3 After the court proceedings, review the testimony with the analyst/technician.
- 20.4.1.4 Note: Due to the nature of sporadic opportunities to witness FBU members testifying, the Trainee is encouraged to observe as many testimonies as possible during their training period and document accordingly.
- 20.4.2 Courtroom testimony question and answer training session with Trainer, General Counsel, or designee including but not limited to, the following topics:
  - 20.4.2.1 Qualifying/Voir dire questions
  - 20.4.2.2 Direct examination
  - 20.4.2.3 Cross examination
  - 20.4.2.4 Explanation of analytical processes and SOPs
- 20.4.3 Participate in a comprehensive mock trial to prepare and evaluate the Trainee as an expert witness in the field of forensic serology and/or DNA analysis.
- 20.4.4 Guidelines for Mock Trial:
  - 20.4.4.1 The atmosphere of the trial should be formal. It should be conducted in the same manner as a real courtroom situation. This includes conduct, protocol, and all other aspects.
  - 20.4.4.2 Harassment of the expert witness by the defense counsel or prosecutor should be kept to the minimum necessary to achieve the desired goal. Questioning by both the prosecutor and defense attorney should be relevant and realistic.
  - 20.4.4.3 The participants can include a judge, prosecutor, and defense. Mock trials require five (5) evaluators, with four (4) evaluators being subject matter experts and one (1) evaluator being a member of the Training Unit. A member of the Quality Unit will be an observer. Each evaluator is required to score the witness using the Mock Trial Scoring Sheet (Document Control Number 7495). Scores will be tallied by each evaluator and combined for a final score. Passing score for a final mock trial is a combined score of 80% or greater.
  - 20.4.4.4 The "attorneys" must be qualified analyst(s), lawyer(s), or suitable individual(s) designated by the FBU Technical Leader(s), FBU Training Coordinator or DFS Training Manager. It is desirable that this person has knowledge in the area in which the Trainee will be testifying. FSL Management reserves the right to use attorneys from stakeholder agencies as participants, evaluators, and/or observers to the mock trials.
  - 20.4.4.5 Permitting "observers" is at the discretion of the FSL Director or FBU Management. Observers can review and provide feedback to

the Trainee as to performance; however, they will not be a grading evaluator.

20.4.4.6 Mock Trials may be videotaped and provided to the Trainee as a feedback mechanism.

20.4.4.7 Evaluators will orally provide feedback on performance with the Trainee immediately following the mock trial. The FBU Technical Leader(s) will provide feedback in writing of any deficiencies and pass/fail status.

## **20.5 Demonstration of Competency:**

20.5.1 Successful passing of at least one internal and one external mock trial, with a maximum of two mock trials provided (2 external and 2 internal).

## **20.6 Documentation:**

20.6.1 Completion of the tasks in this module will be documented where applicable on the checklist titled "Module 20.0 Checklist- Expert Testimony and Mock Trials", the Mock Trial Scoring sheet (Document Control Number: 7495) and formal documentation of pass/fail from FSL Director (or designee), via FBU Technical Leader(s).

## MODULE 20.0 CHECKLIST

### Legal Overview/Expert Testimony/Mock Trial

Trainee:	Trainer:	Job Title:
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#### READING MATERIAL

	Trainee Initials & Date	Trainer Initials & Date
Trainee has read all the required readings for Module 20.0.		

#### PRACTICAL EXERCISES/SKILLS

	Trainee Initials & Date	Trainer Initials & Date
Trainee has successfully completed the practical exercises in Module 20.0, noted the results in their training binder, and results were reviewed by the Trainer for accuracy.		

#### MOCK TRIAL

	Trainee Initials & Date	FBU Technical Leader Initials & Date
Trainee has successfully completed the mock trial.		

Signatures below represent successful completion of Training Module 20.0.

\_\_\_\_\_  
Trainee Date

\_\_\_\_\_  
Trainer Date

\_\_\_\_\_  
FBU Technical Leader Date

## **21.0 Appendix 1: Forensic Biology Unit Trainer's Guide**

### **21.1 Individual Training Plan**

- 21.1.1 Trainer(s) will use the ITP as the training plan for each Trainee. Trainer(s) will serve as the first line verification that deliverables and milestones within the training program have been met. Successful completion of a module will be indicated by the signatures of the Trainee, Trainer(s), and FBU Technical Leader(s).

### **21.2 Training Binder**

- 21.2.1 The Trainee must keep a training binder, electronic or hard copy are both acceptable. The contents are up to the discretion of the Trainee. Trainers should review the binders if there is a question as to whether the Trainee is performing their work, if the Trainee has a question about a particular module they worked on, etc. The binder is designed as a guide/resource for the Trainee. Trainers are not required to devote extensive periods of time reviewing, correcting or grading the binder.

### **21.3 Practical Exercises/Skills**

- 21.3.1 During the practical exercises/skills portion of training, the Trainer is responsible for the following:
  - 21.3.1.1 Providing verbal instruction in the form of lecture(s)/presentation(s).
  - 21.3.1.2 Demonstrating a specific technique or process to the Trainee.
  - 21.3.1.3 Observing the Trainee during their first practice for each technique or process.
  - 21.3.1.4 Providing feedback to the Trainee regarding each technique or process.
  - 21.3.1.5 Answering questions from the Trainee regarding a technique or process.
  - 21.3.1.6 Reviewing and approving each case/batch set prior to the Trainee proceeding to the next case/batch set.
  - 21.3.1.7 Participating in Trainee oral boards.
  - 21.3.1.8 At the completion of each Module, reviewing the Training Binder for accuracy and that it meets the objectives of the exercise(s).
  - 21.3.1.9 Initialing/dating Module checklists.

### **21.4 Competencies**

- 21.4.1 Competencies can be determined through oral boards, written exams, and practical competency tests. Depending on the modules, the competency format will vary. All final determinations of competency will be made by the FBU Technical Leader(s).
  - 21.4.1.1 Oral boards:
    - 21.4.1.1.1 The Trainee should present the required topic(s) orally as if they were explaining the information to a jury. To

determine the technical knowledge base, the panel may ask detailed questions to determine competency level. This method is designed to improve presentation skills, to prepare the Trainee for direct testimony, and to teach the Trainee how to condense information and summarize information effectively. Oral boards should begin with less complex topics and become more difficult over time. Panel members should ask questions that relate to the topic at hand or any previous topics the Trainee has learned in the program. Questions can be a set of questions for that module or questions that were raised during the presentation that may need clarification.

21.4.1.2 Written exams:

- 21.4.1.2.1 Exams must have minimum percentage to pass ( $\geq 80\%$ ) and contain a grading rubric of weight for each exam scoring.
- 21.4.1.2.2 Questions should be varied between exams (multiple choice, true and false, and summary statements).
- 21.4.1.2.3 The Trainer(s) will review with the Trainee any questions that the Trainee did not receive full points.
- 21.4.1.2.4 If the Trainee scores below an 80%, the Trainer and Technical Leader(s) will review the test and determine next steps for retraining.
- 21.4.1.2.5 If needed, the Trainer may require the Trainee to re-submit answers to any questions that were initially answered incorrectly.

22.4.1.3 Practical competency tests:

- 21.4.1.3.1 Tests are administered to the Trainee as would be a proficiency test. The objective is to determine if the Trainee can follow protocols and processing steps accurately to ensure they get the correct answer.

21.5 Failure to Meet the Goals of the Training Program

- 21.5.1 Trainers are often the first line reviewers of a Trainee's work and therefore may first notice when a Trainee is not grasping the material. Trainers must report any deficiencies or issues that may arise with a Trainee to the FBU Unit Manager and FBU Technical Leader(s) immediately. Deficiencies include not understanding technical information, not performing work in a timely fashion, refusing to complete assignments, or general personnel issues.

21.6 Other Duties as Assigned

- 21.6.1 As the Trainee will be exposed to case files and report writing throughout the entire training program, the Trainer(s) will ensure that the Trainee's ability to document notes, write reports and understand the fundamentals of conducting technical and administrative reviews improves over each module.

## 21.7 Modules with Additional Trainer Responsibilities

### 21.7.1 Module 18 – CODIS

- 21.7.1.1 The CODIS Administrator/Alternate CODIS Administrator (CODIS Trainer) will provide formal instruction to the Trainee on topics listed in the training manual.
- 21.7.1.2 This module is separated into two parts (Part 1 & Part 2). Part 1 will be performed once the Trainee reaches the milestone of processing their first independent DNA training sample set. Part 1 includes: the CODIS 101 presentation and discussion, completion of the CODIS computer-based training (CBT) modules and successful completion of the CODIS written quiz.
- 21.7.1.3 Part 2 will be performed once the Trainee reaches the milestone of performing interpretation on their first independent DNA training set. Part 2 consists of the Trainee learning how to use the probabilistic genotyping software data for profile entry into CODIS, including proper documentation through interactive practical exercises.

## 21.8 Module 20 – Legal Overview/Expert Testimony/Mock Trial

- 21.8.1 The Trainer will coordinate with the DFS Training Manager and General Counsel to set up times for mock trial(s). Mock Trials require five (5) evaluators, with four (4) evaluators being subject matter experts. Each evaluator is required to score the witness using the Mock Trial Scoring Sheet.

## 21.9 Timelines for Training Modules

Module	Approx. Duration*
3.0 – DFS Orientation and Introduction	2 weeks
4.0 – Quality Assurance Program	2 weeks
5.0 – Laboratory Safety and Evidence Handling	2 weeks
6.0 – Intro to Casework Documentation	2 weeks
7.0 – Administrative/Technical Review	2 weeks (Admin)/1.5 months (Tech)
8.0 – Blood Identification	2 weeks
9.0 – Semen Identification	3 weeks
10.0 – DNA Overview	2 weeks
11.0 – DNA Extraction	1 month
12.0 – DNA Quantitation	1 month
13.0 – PCR Amplification	1 month
14.0 – Capillary Electrophoresis	1 month
15.0 – STR/CE Data Analysis	1 month
16.0 – DNA Interpretation	1.5 months
17.0 – Statistics	1.5 months
18.0 – CODIS	1.5 months
19.0 – Report Writing	1.5 months
20.0 – Legal Overview/Expert Testimony/Mock Trial	N/A

\* Some modules may be performed concurrently.